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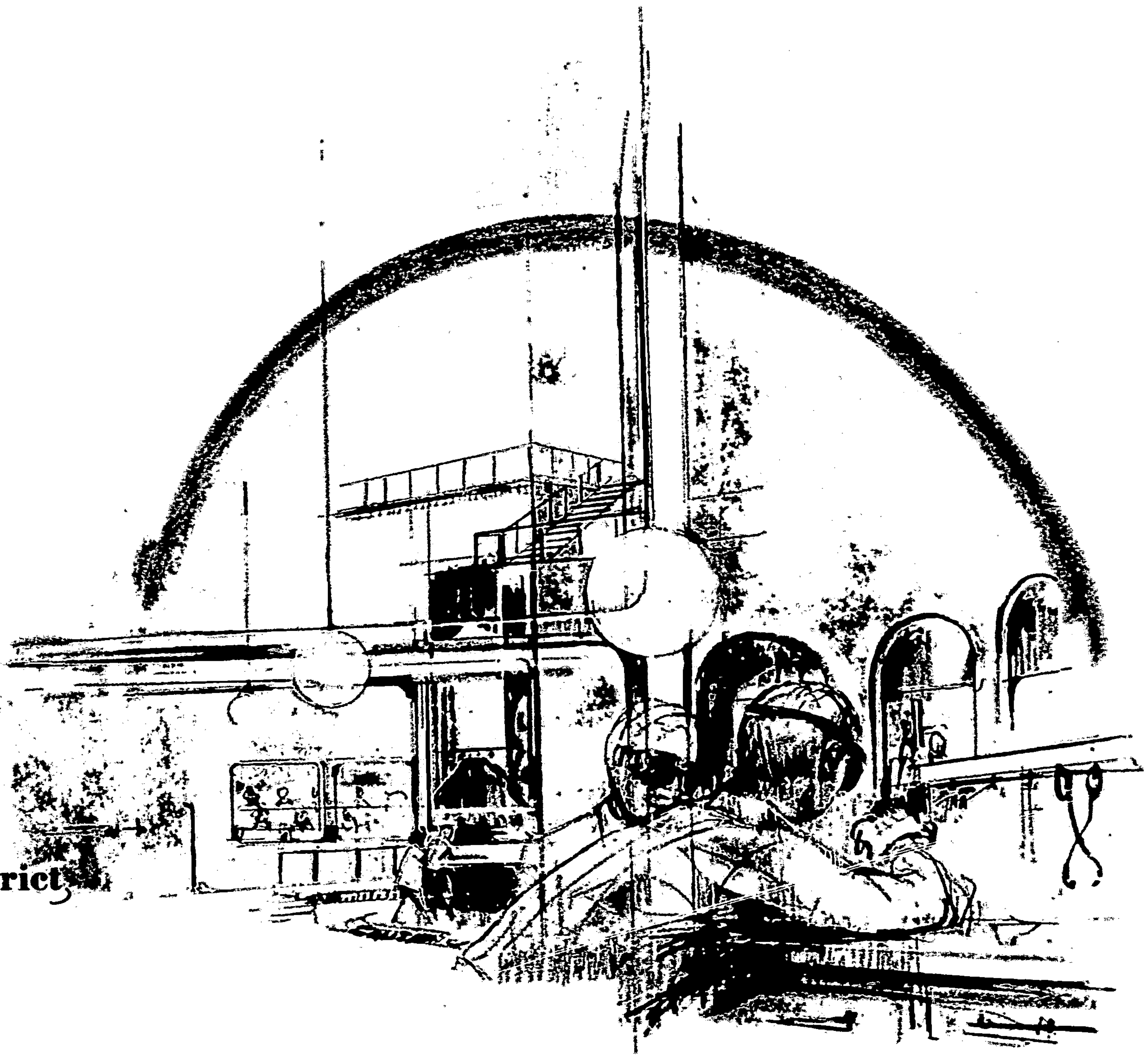
The Richmond Plan is a preparatory program designed to equip high school students for continued education toward a career in a technical field. The three underlying concepts of the Richmond Plan are (1) the experiential, which is basically learner-centered, (2) the interdisciplinary, which is basically teacher-oriented, and (3) the motivational, which is influenced by all controlled environmental factors that will offer the optimum learning climate for both students and teachers. These concepts demand facilities that encourage the interdisciplinary functioning of technical training. Educational specifications for the pretechnology facility should allow for adaption of the interdisciplinary program that will provide a sound general education as well as a specialized pretechnological education. The facility must be designed to meet today's educational needs, as well as to provide flexibility for tomorrow's demands. The educational specifications have been developed so that the architect may develop architectural specifications which will implement the Richmond Plan Concept. In addition to general considerations such as program philosophy and facility implications, educational space requirements for the entire pretechnology facility, the preengineering technology cluster, the paramedical services cluster, and the communicative arts technology cluster are included. (HC)

EDUCATIONAL SPECIFICATIONS
FOR
A PRE-TECH FACILITY



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EDUCATIONAL SPECIFICATIONS FOR PRE-TECHNOLOGY FACILITY.

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FOREWORD

At a time when automation and a growing technology is bringing about a drastic decline in unskilled jobs, our schools are producing an ever increasing number of unskilled high school graduates. At a time when more and more money is being appropriated and more attention is being given to the needs of the special case, the talented or retarded student, the average majority is to a large degree being left to find its own way. At a time when industry is woefully short of skilled technicians who can bridge the gap between the college educated professional and the craftsman, we are faced with the growing problem of high school dropouts who cannot or will not compete in the academic university prep program on the one hand, and are not sufficiently challenged by the craft skills oriented curriculum on the other. It is from just such ironies as these that the Richmond Plan Idea was born.

With an initial grant from the Rosenberg Foundation and with subsequent grants from the Ford Foundation and Educational Facilities Laboratories, representatives from the Richmond, California school system and the Cogswell Polytechnical College of San Francisco have worked together to develop and institute a program for pre-technological education in the comprehensive high school which may play a significant role in resolving the dual problem of widespread unemployment among unskilled teen-agers and the shortage of skilled technicians in industry. Beginning as a study group in 1959 and proceeding with the aforementioned foundation support, a project committee was formed which developed a pre-tech curriculum that was initiated in two Richmond high schools in the fall of 1962. In 1965, the graduating class of these schools included some fifty-six students highly motivated to continue their education and academically prepared to enter a junior college or technical institute. Most significant, the fifty-six were students for whom the probability of high school graduation was low or even unlikely under previously existing programs.

Certainly to the first fifty-six "pre-tech" graduates, the time, effort and resources committed to developing the Richmond Plan were well spent. To them and others like them, this expenditure offers the promise of a future that is productive rather than simply endurable. The Richmond Plan has been shown to be too successful in meeting an insistent need to be merely congratulated and then ignored. The developers of the Richmond Plan and the several educators and school systems adopting it, or adapting it to their needs, are addressing problems too long unanswered. In so doing, they are pioneers deserving the support of the public and industry alike.

ACKNOWLEDGEMENT

It is a pleasure to express gratitude and thanks to the many individuals and committees who have contributed to the development of these educational specifications. Space does not permit the naming of them all, but mention should be accorded the following:

— The members of the Board of Education of the Richmond Unified School District for their unstinting and unselfish personal attention to the needs of the community.

— The Superintendent of the Richmond Unified School District.

— The members of the Pre-Tech Facility Planning Workshop committees — Paramedical Technology Group and Pre-Technology Group.

— The members of the Center for Technological Education, San Francisco State College in cooperation with the Ford Foundation.

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EDUCATIONAL SPECIFICATIONS FOR A FACILITY FOR THE RICHMOND PLAN

INTRODUCTION

These educational specifications have been developed to give an architect a complete verbal picture of a facility so that he may develop architectural specifications which will implement the Richmond Plan concept.

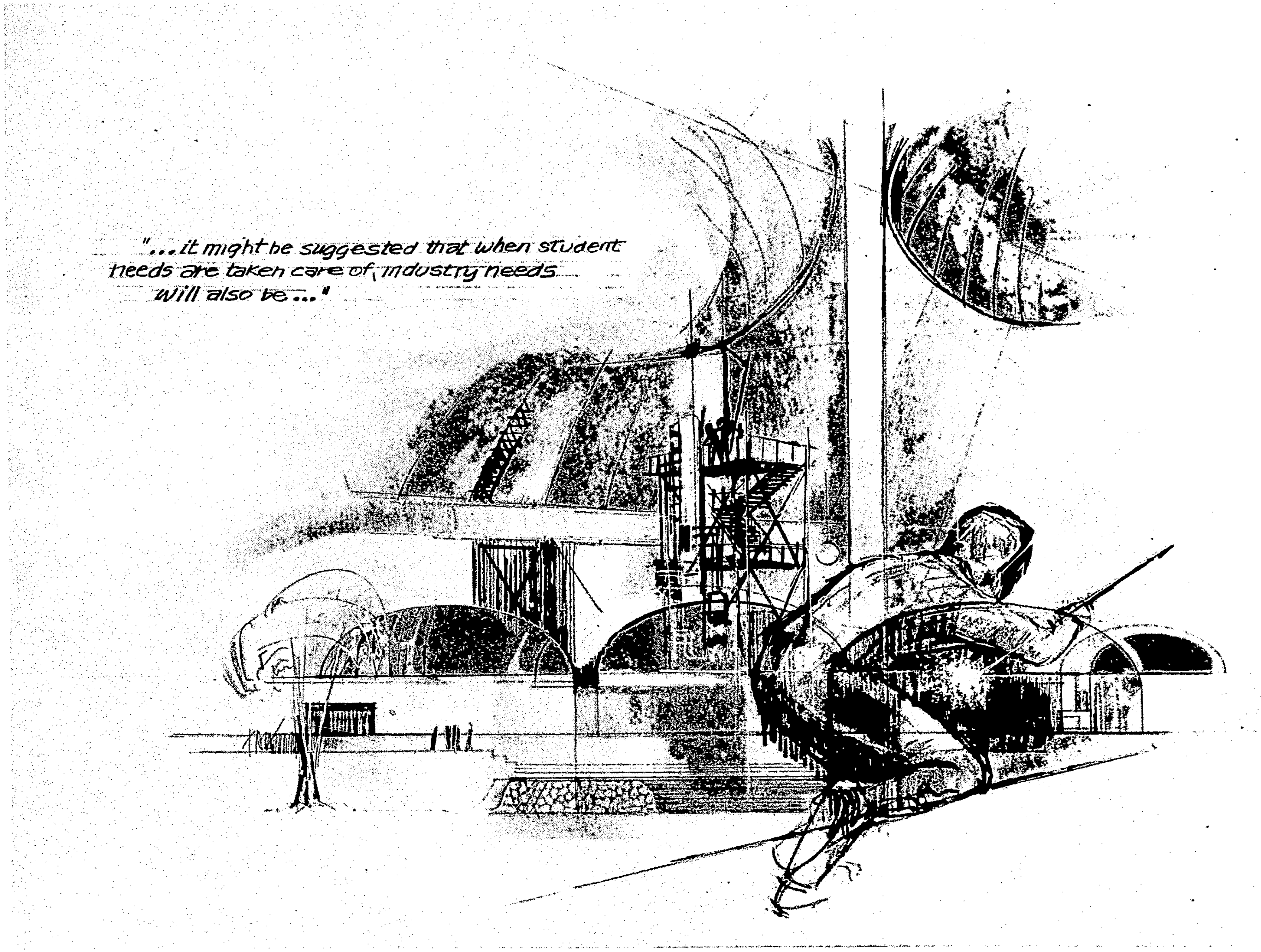
It is felt that the resultant facility will offer an ideal setting for an interdisciplinary approach to Pre-Engineering Technology, Medical Services Technology and Communicative Arts Technology.

Since the first year of the program's existence, existing high schools' facilities were utilized to foster the program, with success. Since the program has been proven successful, student-teacher participants agree that more experiences should be offered in a facility designed to fit the goals of the Richmond Plan and to allow for the development of innovation techniques.

The development of these specifications has uncovered many additional opportunities for interaction and sharing of learning spaces within the individual programs and between the programs.

The prime objective of this effort is to develop a facility that will offer the optimum of learnings to students through curricular experiences in terms of general and technological education by using the interdisciplinary teaching-team approach.

This will be a model facility in which interested educators can observe pre-technological education. In addition, this facility will be utilized for pre-service and in-service teacher training in interdisciplinary teaching.


"...it might be suggested that when student
needs are taken care of, industry needs
will also be..."

THE PROBLEM

Nobody questions the fact that our society needs technicians nor the fact that our young people need employment. Still, we are served by an industrial complex that can obtain only about 10 percent of the skilled technical help it requires annually. Furthermore, we can anticipate that some 30 percent of the young people who will enter the labor force by 1970 will be undereducated for the employment available. It seems obvious that this grievous inconsistency can only be resolved by educational means.

But what are the educational means available? Essentially, high schools are offering a progressively higher quality university-preparatory program at one end of the scale, balanced by industrial arts or manual skills training at the other. In effect, this often means the vast majority of students occupying the area between must either gravitate toward unrealistic goals or settle for less than that which they know to be their real potential. When individuals within this majority are thus left out, it should not be surprising that they "drop out" of school. It might be suggested that when student needs are taken care of, industry's needs also will be met.

A student from this neglected majority might be characterized as a boy ambitious for a career in science or engineering, but unable to keep up the university preparatory pace of study. If he is not provided with goals that are both realistic and rewarding, he will very likely give up altogether. He might be a boy from a disadvantaged environment who has never even considered educational goals beyond high school and who needs only to be made aware of his potential to be motivated to apply it. Or, lastly, he might be a boy motivated toward a technical career, but uninspired by the abstract theory presented in university-preparatory programs in a manner which seems to him to be unrelated to vocational goals or practical application. In almost every instance, existing programs pass such boys by.

PLANNING THE SOLUTION

A year and half of planning proceded the opening of the initial pre-technical education program in two Richmond Schools, De Anza and Ells. The idea for the program began in 1959 when interested teachers from Ells and De Anza met with personnel from Cogswell Institute to determine what high schools could do to improve academic backgrounds of students, at the high school level, so they would not require make-up work before embarking on their two-year technological programs.

The demand for technicians far exceeded the supply, so here was the logical place to develop a program under the Richmond Plan concept.

The first step was completed when funds to support development of a "third-track" pre-technical training for high schools were obtained from the Rosenberg Foundation.

The Richmond Union High School District was selected as the planning ground and an eleven-member study group consisting of staff from the Cogswell College and the Richmond Schools was formed to study the problem and develop a curriculum.

The study group began its deliberations with a six-week workshop on technical education. In addition to studying the problem individually, the members of the study group met with leaders in the field of technical education, with employers, and with public junior college administrators and teachers. Hypothetical programs for specific subject areas were developed, seminars were held to discuss special problems, and professional advice was obtained from industrial consultants before a proposed program outline was submitted to the Richmond School Board.

The six-week workshop was followed by a year of curriculum development during which study group members met weekly to test the ideas developed during the first workshop and to progressively refine the curriculum.

A pre-technical training curriculum was instituted as a pilot program in two Richmond schools — De Anza High School and Harry Ells High School — and the first class graduated from the two-year Richmond Plan program in 1964.

The marked success of the Richmond Plan pre-technical training program has been noted in the forward to this report. Because of its proven success, it is being emulated in many other institutions.

The completion of the proposed Richmond Plan Facility will encourage the development of innovative and exemplary programs on a continuing basis.

MAJOR FORCES IN SOCIETY

No one can predict all the forces that will impinge on our society in the next several decades, and we make no claim to such omniscience. Acknowledging our own fallibility, we accept our responsibility, nevertheless, and identify several trends that seem powerful enough to make a significant difference in the purposes and operation of our educational program in the future.

1. *The Accumulation and Application of Knowledge*

Some theorists estimate that man's accumulated knowledge is now doubling every two years. Though we might question the optimism of such a declaration, we must admit that the growing number of men engaged in the pursuit of knowledge over additive periods of time inevitably contribute at least peripheral new information or corroborative detail to the existing store. Moreover, their colleagues who are continually exploring new applications and combinations of existing fact and principle steadily add still more to the supply of useful, if not fundamental, knowledge. Researchers, technicians and professional practitioners are busy making new discoveries, testing new insights, and achieving new understandings in every field. The implications for education are profound.

In many fields, the basic theoretical formulations, if not the basic content itself, are being revised. What once was considered advanced training is now fundamental, but new studies at the advanced level are increasingly required. Specialization is natural, and new specialities are borne every day. As longer periods of training are required for competence and mastery, opportunities for higher education are increasingly available. The day will soon come when the vast majority of our population will complete a minimum of fourteen grades instead of the present twelve, and the number of people completing all the higher levels will grow proportionally. Moreover, with applied knowledge in particular accruing at such a rapid rate, it will be less and less possible for any training to be terminal and remain adequate. An expanded adult education role will undoubtedly be needed to supplement the services of colleges and universities.

The expansion of knowledge will inevitably affect the selection and organization of content in the secondary curriculum and the frequency of its revision. The role of the secondary school as a preparatory institution will be more broadly conserved, and cooperation with institutions of higher learning will perforce become closer. Teachers will need more frequent retraining to update their knowledge and skills, and instructional materials will become obsolete in amazingly short periods of time. New discoveries in the behavioral science will have wide influence on the organization and methodology of instruction.

2. *Advance in Technology*

Nowhere is the explosion of knowledge more apparent than where it finds immediate application in the field of technology. Everyday the number of mechanical processes and functions in business, industry, government, and home grows larger. From the electric knife to the automated production line, machine power is steadily displacing manpower. Gadgets, devices and tools, and the machines that produce them, are ever more sophisticated in design, more integral in operation, more complicated to manufacture or repair. In routine sorting or computational tasks and highly complex problem solving, high-speed data processing equipment is displacing brain power; it is faster, more accurate and more reliable. The computer sciences are developing so fast that they render each new development obsolescent almost before it reaches the market. Technology is being applied to ever more subtle and intricate problems, from the exploration of outer space to the farming of the sea, from the penetration of the atomic nucleous to production of replacement parts for the human heart.

The speed and diversity of technological development have pro-

found effects on the members of our society. The complexity of the products of technology requires higher levels of training in those who produce and maintain them and often in those who operate them. This in turn leads to greater specialization of labor, while the rapidity of change in product design and principles of operation demands continual retraining of workers at all levels of production, service or operation. Skills become suddenly archaic; jobs become superfluous overnight. Both psychological and financial security are threatened.

Mechanization, specialization and complexity combine to make individuals less self-sufficient and more interdependent. Individuals are further and further removed from the final results of their labors; there is decreasing room for independent decision making. There is greater necessity for teamwork, no place for the rugged individualist. The pressure toward conformity is strong. As more processes are mechanized and more jobs are specialized, the proportion of roles requiring skill in human relations grows accordingly. Maintaining a sense of identity, a feeling of productivity, and a belief in creativity becomes a new order of problem.

3. *Speed of Transportation and Communication*

The advent of the Mach II airliner and the telstar satellite ring will still further diminish the time-space relationship in the social, economic and political intercourse of the human race. The time is not far off when any place on earth can be visited from any other in a matter of hours, or when no place is beyond the reach of instantaneous communication. Racial and cultural differences will cease to be bizarre abnormities; their encounter will be commonplace. Traffic to both centers and outposts of civilization will grow till the two are indistinguishable. Both the special events and everyday happenings of every land and people will be immediately accessible everywhere.

Considering the already powerful influence of the mass media and the potent impact of culture on culture in our own time, these eventualities can hardly be viewed with simple optimism. At the least, they represent challenges to the human capacity for understanding, for acceptance and for sensitivity. We will require forbearance and tolerance, discretion and discrimination, flexibility and growth if we are to make our communication good, our relationships friendly, our differences creative. Perhaps we shall someday be part of a world culture in which the extreme variations have been eliminated, but hopefully it will preserve the richness of diversity and not become a blind leveling of all mankind into some bland sameness.

Again, the implications for secondary education are strong. The need for cross-cultural understandings, for the appreciation of differences, for a high order of social skills is paramount. The need for an ever widening command of diverse languages seems unquestionable. The need for communication skills, not just in language usage, but in sensitivity to feelings and perceptions, is clear and essential. The need for discrimination in selecting and interpreting the products of the mass media, whether news or entertainment oriented, is vitally important. All of these suggest new dimensions and emphases in the curriculum and instructional pattern of the high school.

4. *The Population Explosion*

Both the burgeoning population of the world and the increases in absolute numbers of Americans have grave significance to the citizen of tomorrow. Not only the birth rate, but the increasing infant survival and adult longevity rates contribute to the problems of feeding, housing, clothing and controlling the growing numbers of Earth's inhabitants. The population pressures in Asia cease to be matters of academic curiosity and become questions of national and social survival.

The immediate impact of the growing population of the United States combines with improvements in agricultural technology and the centralization of production to foster urbanization. The metropolis of yesterday is becoming the megalopolis of tomorrow; by 1980 it is projected that 80% of the American people will live in three sprawling urban areas—one stretching from Bangor, Maine, to Norfolk, Virginia; another from Minneapolis to St. Louis, and a third from San Francisco to San Diego.

This trend has serious implications for the welfare of our society. First of all, it places a great strain on our natural resources to supply the necessary water, power and other raw materials demanded by these concentrations of humanity. Second, it places the vast majority of individuals in a highly dense locus of people and subjects them to all the pressures of close living, group values, tastes and habits, and complex social and political organization. Distance from nature, from open plain or forest, from natural stream and mountain, grows in both reality and imagination. Solitude becomes increasingly hard to

attain. Problems from pollution and exploitation of natural resources become both more immediately felt and more difficult to control. Distance from the seats of political decision making appears increasingly great. Individuality is severely jeopardized.

From abroad, the individual is subtly threatened with the rising demand for room and food. His relatively comfortable position is increasingly coveted by the teeming millions who daily learn more about the relative affluence but understand little about how it was obtained. He needs the strength for self-consciousness within his own culture, the source for humanity without.

5. *Attacks on the Inequities and Inequalities in an Affluent Democracy*

Both the power of our ideology and the temper of our times highlight the ironies of poverty in the midst of affluence and of discrimination and inequality in the nation which champions world freedom. Neither the weight of tradition nor the fear of consequences can stay the drive to make the reality coincide with the ideal. Voting rights, fair housing, fair employment, and the War on Poverty are banners which ultimately will not be denied. No group more wholly espouses the cause, no group more rejects the hypocrisy of the past than the young of today. Idealism is their philosophy, "action" their slogan.

The complexities of causation, the differences between change of status and change of heart, the prerequisites to permanence, are no concern of the defenders of the downtrodden or of those they would serve. They lack the experience to foresee the inevitable failures, disillusionments, and frustrations on the way to erasing poverty and achieving equality. Schools must provide them with perspective to avert cynicism, capitulation, rejection of principle, or maybe even revolution.

Equally important, schools must begin providing the basis for the disadvantaged to capitalize on their opportunities, for the second-class citizens "to behave appropriately in their first-class status." Man cannot legislate behavior or attitude or knowledge or values; he can only outline the possible and define the punishment for those who obstruct progress toward it. The school experience must reflect the needs of the growing individual rather than the stereotypes of what education "ought to be." Insight must temper intuition; understanding must modify tradition. The school environment itself must provide the richness that will characterize the homes of the first, and succeeding, generations of the ex-poor and disenfranchised members of our democracy.

The failure of a laissez-faire society to solve its social problems through the free choice and altruism of its citizens have prompted both governmental commitment to and public support for increased political involvement in the regulation of human affairs. Whether governmental interference in the economic, political and personal lives of the people becomes a force for creativity or oppression may well depend on how intelligently the people are prepared to control it. The meaning of "education for democracy" becomes ever more profound.

6. *A Changing Value System*

Since the discovery that our universe is heliocentric, Modern Man has faced a succession of challenges to his value system by new knowledge or invention. Though he has often been slow to accept the validity or utility of the new, the fact that change has in fact occurred in so many dimensions of his life testifies to Man's inherent power to adapt. In the past, the profound changes have occurred at a sufficiently moderate rate to be assimilated with minimum social disruption. It has taken some time for their full implications to be seen and the personal traumas and injustices they have caused to be undone.

The larger absolute population of today with its concentration in urban areas combines with the acceleration of change in Man's knowledge and technology to both intensify and complicate the problems, however. The changes are coming too fast and their implications are too severe to be left unattended till after they have made their impact and caused their damage. The results to change must be anticipated, problems planned for, people prepared. Continuity must be insured to guard against disorientation; new values must be available to substitute for old ones displaced in order to avoid cultural disintegration on the one hand and radical reactionism on the other.

Challenges to present values are numerous. Applications of automation and cybernetics are threatening to remove work as a major focus of productive activity and as the accepted basis for the distribution of wealth. The increasing movement to urban areas and the growing complexity of social and economic organization are forcing individuals into larger social units and more interdependent living

and working situations. There are mounting pressures toward conformity, rising deterrents to the independent behavior and individuality extolled in the American tradition. The mobility fostered by rapid transportation, urbanization and the diversification of industry is creating a large segment of our population without community roots, removed from family ties, and lacking the stability and identity these primary groups provide. The increase of families with two working parents is changing the patterns of family living and the role behavior appropriate to the sexes in our culture. The advent of birth control pill, by preventing ovulation itself, may have a revolutionary effect on both personal and religious attitudes toward sexual relations, leave a vacuum in clear social guidelines about sex for young and mature alike, and jeopardize many interpersonal and marital relationships. The extending period of training required for vocational preparation, along with the displacement of human labor by machines, is postponing still longer the time when the young are inducted into adulthood and strengthening the existence of an adolescent sub-culture within our society.

These are but a few of the significant behavior patterns and values of our culture which are being threatened by change. Each one has many ramifications which can influence the character and stability of our society. Just as important, they represent together the increasing rate and extent of change and highlight the shift away from stability and continuity as sustaining cultural values. The citizen of tomorrow will need a high degree of flexibility to tolerate the multiplicity of changes occurring simultaneously in his world. He will need, too, some dependable reference point, some perspective on his heritage, which will allow him to continue to integrate and make sense of the individual changes in terms of some larger system.

7. *Education: For One and All*

For the sake of the national welfare and of each individual with a potential contribution to it, "academic" and "vocational" education must no longer remain separate and unequal structures within the schools. Especially today, the traditional reasons given for separating the two are based on a "very false assumption," Grant Venn, Associate Commissioner, U. S. Office of Education, Bureau of Adult & Vocational Education, told *EDUCATION U.S.A.* Vocational education must now be the concern of all schools in providing services to all their pupils.

Venn points out that today's highly technical society requires skills of all its members as well as a basic education to assure effective participation—dispelling the antiquated concept that "academic" preparation is for the fortunate students blessed with brains, and "vocational" training for the educational rejects, equipped only with muscle power. Since almost all occupations require "more use of the mind than they do of the hands" and since the goal of all persons is a place of some value in the nation's work force, it is essential that the schools accept their responsibility to prepare each student to make his maximum contribution.

PHILOSOPHY AND HISTORICAL BACKGROUND

The Richmond Plan program is a preparatory program designed to equip high school students for continued education toward a career in a technical field. Its most significant aspect is that it does so in a manner that serves the purpose of a large group of students heretofore neglected. Students completing the program are well qualified to enter and complete technical programs in either public junior colleges or private technical institutes and are also promising candidates for apprentice training in industry. Although it was created as an alternative to the university preparatory program, the Richmond Plan curriculum does make it possible for students to obtain a four-year university education via the Junior college.

Perhaps the Richmond Plan is best described by the means employed in accomplishing its objectives.

Students are carefully selected for the program by a process that attempts to insure their success. Criteria for selection include the results of a battery of appropriate tests and information gained from personal interviews. Once selected, both the student and his parents are made aware of the fact that the student will be entering a program designed specifically to help him achieve goals that are both realistic and worthy of his best effort.

The curriculum emphasizes applied knowledge obtained by a practical synthesis of the disciplines of science, mathematics, language and industrial arts. What the student learns in one class is reinforced by what he learns in another. In mathematics, he learns to solve problems confronted in building a laboratory project. This project, in turn, physically demonstrates or applies some principle he is learning in science. His English course provides him with the vocabulary common to the unit he may be covering in science and in the laboratory and develops language and writing skills that can be applied specifically to communicating technical ideas and reporting his project. While acquiring drafting skills, he also draws plans depicting his laboratory project design. Although his course work is "subject matter" oriented, the pre-tech learns about social problems in such large terms as the effect of science on society or the economics of the devices or the raw materials with which he is working. Instead of learning abstract theory as preparation for understanding the more complex concepts encountered in higher education, the pre-tech student moves directly from theory to things, from the abstract to the demonstrable, and what he learns from a single discipline not only relates but is directly applied to what he is learning in the other disciplines at the same time.

Teachers work as a team to reinforce clearly defined interdisciplinary objectives. Curriculum objectives for each unit of instruction are formulated and agreed upon by four teachers on the teaching team. These objectives are spelled out in clearly measurable terms. As a result, students not only understand what they are doing, but why they are learning a particular thing at a particular time. Further, they know it will have a direct bearing on the next thing they learn. Together, the teaching team establishes testing criteria, prepares course outlines, and sequences the subject matter in a logical and meaningful way. Instructional materials are selected on the basis of potential interest to the student, understandability, applicability and usefulness. Specific instructional items are also evaluated in terms of their relationship to other items, in keeping with the interdisciplinary character of the instruction. The student is provided information in small increments, guided toward responses that induce further responses that carry him along a developmental path, informed of what he is doing at every step, and given the opportunity to demonstrate that he has reached desired objectives at the time he reaches them.

THE RESULTS SO FAR

Although the Richmond Plan has run through three graduation cycles, any conclusions as to long-range results must be qualified

by subsequent experiences in both Richmond and other high schools. One incontrovertible result, however, is the fact that fifty-six students in the first class of sixty did graduate from the program—in spite of the fact that they represented a group of students who, under other circumstances, could have been adjudged potential drop-outs. Furthermore, some twenty in the group graduated as honor students.

Fourteen students in the first graduating class enrolled in junior college, three in a polytechnic college, two in a university, and five in technical employment. The subject fields covered by those continuing their education included electronics, engineering, chemical technology, architecture and English. Certainly to these students the program must be a startling success.

The most current and constant evidence of the success of the program is the fact that students in the program are staying in it. More important than the improved grades, which have become commonplace, is the high degree of motivation apparent among students formerly characterized by their lack of motivation. Students are repeatedly encouraged by the sense of success demonstrable progress provides and are accepting the challenge that many of them had formerly rejected, that of building a career.

THE NEXT STEP

There are many directions in which "third track" pre-technical training might go, and the program for such training defined by the Richmond Plan should be considered no more than a firm beginning. As many other vocational areas might be included within a similar third track as there are vocational offerings in junior colleges and other post high school institutions. Even the pre-tech training in engineering technology offered by the Richmond Plan will be modified from one high school to the next according to the perception of the school personnel involved, existing programs, equipment and facilities available, and local opportunities for articulation with post high school vocational programs. How the Plan may be adapted, or what might be added to it to increase the number of opportunities offered by a third track requires further investigation. The possible applications of flexible computer scheduling also merit study.

Perhaps the most insistent demand at present, however, and that which defines the next logical step to follow in Richmond's pilot program, is that having to do with facilities. The Richmond experience demonstrates that the need for the third track alternative to university preparatory and vocational skill courses in contemporary schools is so great that it must not wait upon new facilities.

While experience has demonstrated that the third track program may be successfully instituted in existing facilities at a cost not significantly greater than existing industrial arts programs, it has also shown that the form of the pre-technical program is conditioned by its physical environment. This shaping of the program to fit the facility represents a restriction which *must* be removed. Whether the third track program shared facilities with the university-preparatory track or with the pre-vocational track would not be of critical importance, provided that the equipment and the spaces available were of a kind which would allow the third track program to retain its integrity as a distinct alternative. In practice, existing facilities rarely provide this opportunity.

The Richmond Plan and any similar program will demand facilities that encourage the interdisciplinary functioning of technical training. In general, this means spaces must be available that are highly flexible in terms of possible use, and yet that adhere to the principle implicit in the idea of the "applications laboratory" as a focal point for supporting academic areas. The use and arrangement of the spaces must further the unique objectives of a career-oriented program based on "applications" learning and interdisciplinary instruction.

THE PHILOSOPHICAL CONCEPT

These educational specifications for the pre-technology facility should allow for adaption of an interdisciplinary program that will provide a sound general education as well as a specialized pre-technological education. A high level of involvement of the learner in the processes of learning requires of him a significant control of his environment. This involvement enables the learner to reinforce conceptual learning with meaningful experiences at the practical level.

This facility must be designed to meet today's educational needs, as well as to provide flexibility for tomorrow's demands. Philosophical concepts basic to the educational program will determine the facilities rather than the physical design limiting or dictating the program.

Some identifiable characteristics of the Richmond Plan that have emerged through practice are:

1. The learner to a large degree controls his environment.

2. The learner is accepted for what he is and where he is academically; his learning experiences are to be carried forward from this point.

3. The learner's experiences are individualized to his specific interests and talents.

4. The learner sees value in real-life experiences that are made meaningful through immediate application.

5. The learner develops ability to solve problems through the creative challenge of the parameter approach method.

6. The learner is motivated by the learn-by-doing approach to education.

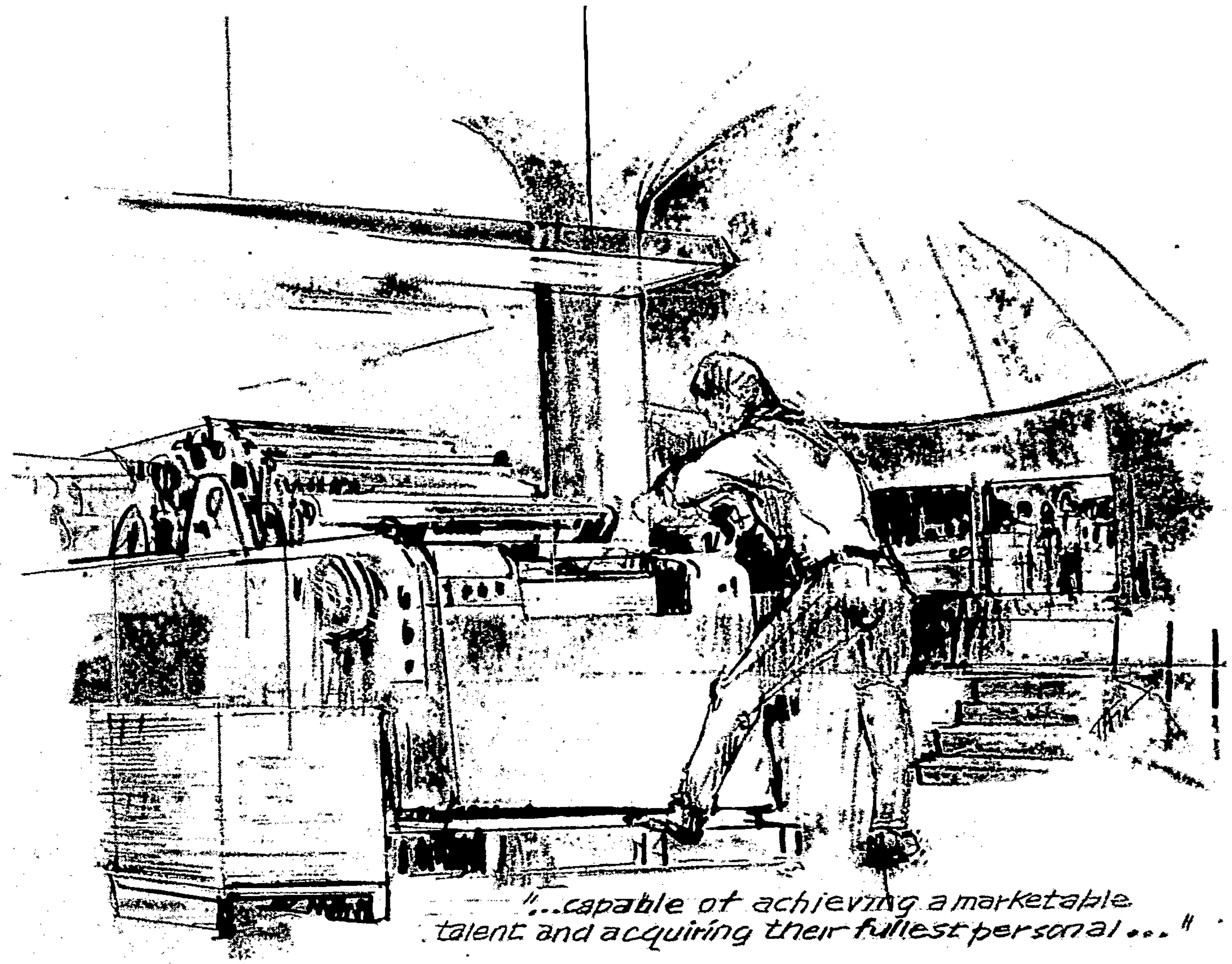
7. The learner develops pride and a sense of belonging to programs with which he can identify.

PURPOSE OF THE PROGRAM

Prior to developing concepts, beliefs and curricular offerings, the Richmond Unified School District was involved in discussions with representatives from technical institutes, persons in industry, and research and technical institute graduates. They found out that industry has need for the technical institute graduate as he is now trained; that this training is modified to the needs of industry. The technical institutes said, "Give us students with a good pre-technology high school background and we can do a better job training, and place them in industry or research."

Currently, industry has a tremendous need for trained technicians. Sources of supply are graduates of technical institutes, university engineering students and high school graduates through apprenticeship programs. The best source of supply is the technical institute. However, these institutes derive their trainees from high school students who are either disenchanted with traditional university-preparatory programs or those with no inclination to attend college. This results in the institutes offering a make-up program that could be eliminated if students had an appropriate high school background.

Pre-technician tracks in the high school afford a rich curriculum to students who could go on to higher education.



"...capable of achieving a marketable talent and acquiring their fullest personal..."

BASIC CONCEPTS OF THE RICHMOND PLAN

There are three underlying concepts that are essential to and help identify the Richmond Plan approach to learning. They are: (1) the experiential concept, (2) the interdisciplinary concept, (3) the motivational concept.

The *experiential concept* is basically learner centered. Permeating this concept is the principle that every learner, to the extent that it is possible, will control his learning environment. This means that he will be involved in self-imposed and self-directed learning experiences that will come within the curricular objectives of the program. There will be built into the facility individualized learning areas in which the learner will be allowed to experiment and create within clearly defined parameters. There will be areas where the learner can personalize his learning experiences through the use of media and resource materials.

The learner will have space in which to plan and to perform supportive investigation essential to the development of articulatory devices which reinforce learning. He will be provided space, when necessary, where he can set up equipment and apparatus for extended periods in order to observe phenomena and record data. There will be space provided near these application areas that will permit the student to read, write and plan the experiments and demonstration devices he is working on to reinforce his learning experiences in other areas.

The learner will be able to carry forward the learning experiences revolving around the articulation device he is developing to demonstrate physical phenomena in all discipline areas within the total learning environment. It is essential that all conceptual learning be reinforced by manipulative learning in so far as possible. It is highly desirable that conceptual areas "spill over" into application areas at times, in order to make the theoretical more understandable. There would exist at the same time provision for closing off outside distractions when this is desirable.

Simultaneously, the learner will be required to operate as a member of a team. He will learn to work with others and to develop a sense of group responsibility and cooperativeness. He will take pride in being a member of the program, his team—a feeling of belonging. He should be made to feel "special."

The learner will have easy access to all factors that will enhance his learning process. This will include the teacher, guidance, resource materials, supplies, equipment and media. A central supply area will be included that will provide all anticipated equipment and materials that the student will need. This material and equipment will be immediately available to the learner so that his interest is not permitted to diminish.

The *interdisciplinary concept* which is basically teacher oriented must be enhanced and strengthened by the facility. The facility design should permit visual and physical interaction of the teaching team with students and one another.

Space must be provided for teacher planning. This would imply space for group planning by the teaching team and additional space for individual planning and retreat.

A teacher material center will be easily accessible to teachers. Space will be available to obtain resource information, for duplication of materials, and for storage of general classroom supplies.

On occasion, it will be necessary to bring together the student, parents and teaching team members. Space also must be provided for this purpose.

A director will be provided for this building. One function of this person will be to coordinate the educational program; a second, to expedite the teaching activities that will take place; another, to enhance public relations. He will be assisted by three administrative, teacher-coordinators who will head each program.

It is anticipated that a facility of this type will capture the interest of other educators in the learning activities going on within

it. Visitations will be a natural result of these interests. The facility will be designed to enable the director to conduct tours without interfering with the learning process.

The facility will be used by pre-service and in-service teaching teams. Student teachers will use the learning centers for practice teaching; therefore space must be provided for them to meet with their supervisors.

The *motivational concept* is influenced by all controlled environmental factors that will offer the optimum learning climate for both students and teachers.

Administrative support to the programs will reflect in the attitude of teachers and pass on to the students.

More than ever, a community-facility interaction must be developed to insure a constant positive image that this is a pre-college facility and not a "trade school" for the "less able."

The facility will be built so that the fullest use of motivational media will be attained. Further, the facility will be adapted to the program and the student. This means space shapes and sizes may be modified, utilities will be available to equipment, and, in general, the entire facility will be readily changeable to meet changing needs in the curriculum.

To insure a pleasurable environment, thought must be given to sound, odor, form, light, air conditioning and landscaping.

The desire to place responsibility of self-discipline on the student can be assisted with a minor factor of having free-flow traffic areas that are accessible, but not disturbing to learning spaces. Students shall be able to move from space to space without carrying the odious "pass." The theme will be, "you will be completely responsible for your actions when you are on your job, why wait to develop self discipline? Let's assume complete self-responsibility now."

In conjunction with the foregoing paragraph, the student will have access to information in the resource centers—immediately. When stumped on a problem, the answer should be available at the time the problem is there, and not sought in a library after school.

Group-developed media are most important. To build an aid that will reinforce his learnings in the other disciplines is important to the individual and to all others. To insure that more time is spent in building than searching for materials, supply rooms shall be readily accessible to all work stations. Red tape on procuring supplies shall be cut to a minimum. Possibly, the use of technicians in control of supply and distribution will expedite this.

In summary, every environmental factor that may affect the student must be considered. Not merely does the facility fit a geographical environment, but what should go within and without the facility should serve the student in developing a positive learning philosophy. This will enhance independent investigation on the part of the student.

GLOSSARY

ADVISOR — One who counsels or advises; a member of the staff.

BEHAVIOR — Manner in which one reacts under environmental change.

CARREL — A small alcove for individual study.

CENTER — The middle of an activity.

CENTRAL STORE ROOM (or Central Stores) — A room accessible to all disciplines.

CLUSTER — A group of spaces within a periphery of facility.

COMMONALITY — Those curricular offerings or physical areas which are interchangeable with other pre-tech areas.

COMMUNICATION — Interchange of thoughts.

COMMUNICATIVE ARTS TECHNOLOGY — The science and art relating to the development of all forms of communicative media.

CONCEPT — A mental image of a thing formed by generalization from particulars.

CONCEPTUAL LEARNING — Those learnings derived through the mental processes without the use of physical media.

COORDINATOR — One who coordinates the activities and program of students.

DIRECTOR — One who has the major responsibility of directing the facility.

DISCIPLINE — A branch or body of knowledge.

EDUCATIONAL SPECIFICATION — A statement of the educational program that will operate in a facility.

ENVIRONMENT — Controlled influence of human behavior in an educational situation.

EXPERIENTIAL — Learnings through physical involvement.

EXPERIENTIAL CENTER — The space in which applied education and activities occur.

FACILITY — A space or spaces that promote ease of educational action.

FLEXIBILE — Readily adjustable to changing conditions.

INTERACTION — Interplay of various disciplines or individuals to reinforce learning.

INTERDISCIPLINARY — The interaction of two or more branches or bodies of knowledge.

LEARNING SPACE — A place where learning takes place.

MEDIA — A means of exchanging ideas.

METROLOGY — The science of weights and measures.

MOTIVATIONAL (ARTICULATORY) DEVICE	A theme or object which incites an individual to action.
PARAMEDICAL SERVICES	A program designed as a supporting role to the medical field.
ROLE PLAYING	Simulated or real learning activities performed by the student.
SEMINAR	A face to face group, usually eight to twelve persons.
SYSTEM	An assembly of concepts united through interaction, or, a set of inter-related elements organized to perform a function.
TEAM	A group of teachers from the several disciplines working together on planning and teaching.
TECHNICIAN	A graduate of a technical institute who is a liason person between an engineer and a craftsman.
TECHNOLOGY	Systematic application of the arts and sciences in various fields.

FACILITY IMPLICATIONS

The major forces at work in our society and the evolving trends in secondary education have significant implications for the design of a new school plant. At the most general level, the structure should reflect a future orientation in the materials of its construction, the shape of its interior spaces, the layout of its various elements, and the details of its appointments. It should consciously, if subtly, reinforce through its design, its colors and textures, its area relationships, its juxtaposition of functions, its traffic patterns and its outside areas the purposes and emphases of the program it houses.

CHANGE and FLEXIBILITY

Because change is a significant characteristic of the society and of the educational program, the building must reflect this phenomenon in both the number and variety of opportunities it offers to display or demonstrate innovation and in its own capacity to undergo easy internal alteration. The finishing materials, the utilities, the operating details should to the maximum degree consistent with economy reflect the latest developments in building techniques and operational systems. In addition, every opportunity for interior and exterior display and communication should be exploited. Certain key points such as entries and traffic centers, should be capable of transmitting continuous audio-visual messages through tapes, films, slides and the like. The interior dividers should be demountable so that changes in program can be easily accommodated. Utilities must be carried in a fashion that creates a minimum of limitation on space shapes or classroom orientation. Flexibility is a critical requirement.

INTEGRAL FUNCTION and RELATIONSHIP

The need to demonstrate the wholeness of knowledge, the evolving inter-relationship between departments, and the intention of dual or conjoint use of space all point to a closely integrated campus with minimal distances between areas. The provision of adequate outdoor playfields or physical education, as well as the preservation of the fine trees on the site, also supports this idea. Wherever possible, interior spaces should serve more than one function, for example as corridors and sound separators or lounge areas, or as study areas and passageways. All areas should be arranged for easy interaction between people and between functions. Movement should be fluid and efficient. Office and study areas should promote teacher-student relationships and teacher-teacher transactions at the same time they permit privacy or separation when it is desired. Access between office areas and resource centers and classrooms should be as direct as possible.

INDEPENDENCE and IDENTITY

The school plant should aid in the promotion of independence and individuality as antidotes to the pressures toward complex social organization and conformity. Provision of spaces for independent study, quiet areas, and aesthetically pleasing areas that promote reflection will be important to this end. Such locations should have physical attributes that encourage responsibility and independence without secrecy or mischief. This implies such things as sound attenuation, a minimum of distraction, pleasant but quiet vistas or enclosed areas with localized centers of interest, and some visibility for unobtrusive supervision.

RESPONSIBILITY FOR LEARNING

A major general purpose of the school will be to promote individual responsibility for and skill in the process of learning and a lifelong commitment to it. Essential to this purpose is the accessibility of a broad range of resource materials and appropriate places to use them. Therefore, the communications-resource materials center will be the central focus of the school, and satellite study areas will be provided in most departments. The Engineering Technology, Para-

medical and Communicative Arts Technology and their independent study areas will surround the A/V Nerve Center itself; other disciplines should have easy access to the resources of the Nerve Center. An increasing variety of audio-visual equipment and materials will become available, and teachers will develop more skill in their use. Such materials will also become increasingly available to students.

The plant then, must house varying sized groups, provide for different kinds of instructional activity and for rapid changes of activity during an instructional period, and have the capacity to house new equipment appropriately. Overhead projectors may replace chalkboards in classrooms, closed-circuit television may reduce the need for film and slide projectors, and automated study carrels may well provide individual audio-or-video instruction in a large portion of the school. Some of these developments we can already choose to include; some we can only anticipate for the future. The crucial factor is to provide the capacity to accommodate as many as possible of the technological aids to instruction that become available to us.

DEVELOPMENT OF HUMAN RELATIONS

Because the world of tomorrow will place increasing demands on social and human relations skills, both in working and social groups within our society and in intercultural understandings, the school facilities should support program efforts to develop these skills. The student center, lounge areas, foyers and various natural outdoor areas should invite spontaneous congregation in small groups. The environment should repeat the theme of understanding and carry awareness of the richness of our culture.

Throughout the plant it should be easy to be thoughtful of others. Lockers and corridors should be located so as to cause minimum distraction to students in classes or study areas. Sound attenuation should receive careful attention, especially in congested areas and widely used entry points.

INSTRUCTIONAL ORGANIZATION and TECHNOLOGY

The new plant must facilitate the many changes in instructional organization and accommodate the flow of new developments in technology that are already influencing secondary education. The drive to individualize instruction through new grouping practices, new patterns of scheduling time and regulating group size and activity, and new developments in instructional materials will accelerate. Staff organization will promote cooperative planning and team teaching.

EDUCATIONAL SPACE REQUIREMENTS

Richmond Unified School District has planned for an exemplary pre-technology facility with an enrollment of 360 students and it is assumed that the school population will be similar to that of the present high schools now in operation; that is, students will have a range of backgrounds, interests, and aptitudes similar to those of the present students in the district.

Based on present experience, approximately 85 percent of the high school graduates from the pre-technology programs will continue their education in technical institutes, community colleges, and/or four-year schools. Because the Richmond Unified District also has responsibility for its graduates who are terminal as well as those who compete for higher education, the pre-technology program must be comprehensive in nature; that is, the program must provide an education suitable to the student who will be entering the world of work and, at the same time, provide the academic background necessary for the student oriented to higher education.

In order to determine the number, kind and size of the educational spaces which will be required to house the pre-technology program in the Richmond Unified District, the following procedures were employed:

A. The number of students that could normally be expected to enroll in each of the elective and required courses were determined for approximately 360 students. This prediction was based on previous program experience (1961-1966) in the existing high schools (De Anza and Ells).
B. The information thus obtained was translated into the number of periods required to meet an enrollment of 360.
C. Based on the number of periods needed for each subject area, the number of teaching stations was determined.

Data gained from these procedures is summarized on the basis of minimum number of spaces. Through interaction with the present pre-technology faculty, additional spaces were identified above the minimum number of spaces presented on the following table.

SPACE ALLOCATIONS AND AREA RELATIONSHIPS

Space allocations and area relationships demand that attention be given to the separation of noisy areas from those in which quiet is desired, and to the relationships among activity areas. Such relationships are diagrammed and presented with suggested space allocations on the following pages.

*SPACE NEEDS COMPUTATION — PRE-TECHNOLOGY FACILITY

Enrollment 360

Center	1 Percent of Current Student Participation	2 Number Students	3 Average Student Load Periods	4 Class Sections Needed	5 Teaching Stations	6 Computed Stations	7 Adjusted Stations
Business Machines Area (Core center)	30%	108	24/6	4.5	.7	1	1
**Communications Technology			24/6				
1. Speech-Drama-Broadcasting	39%	140		5.8	1.0	1	
2. Graphics	33%	119		5.0	.8	1	1 large
3. Instrumentation	27%	104		4.3	.7	1	
English	100%	360	28/6	12.9	2.2	2	2
Engineering Technology			24/6				
1. Materials	39%	140		5.8	1.0	1	
2. Design	33%	119		5.0	.8	1	1 large
3. Production	27%	104		4.3	.7	1	
Journalism	15%	54	24/6	2.3	.4	1	
Mathematics	100%	360	28/6	12.9	2.2	2	2
**Para Medical Technology			24/6				
1. Social	39%	140		5.8	1.0	1	
2. Medical	33%	119		5.0	.8	1	1 large
3. Clinical	27%	104		4.3	.7	1	
Science	40%	144	24/6	6.0	1.0	1	1
Social Science	100%	360	28/6	12.9	2.2	2	2

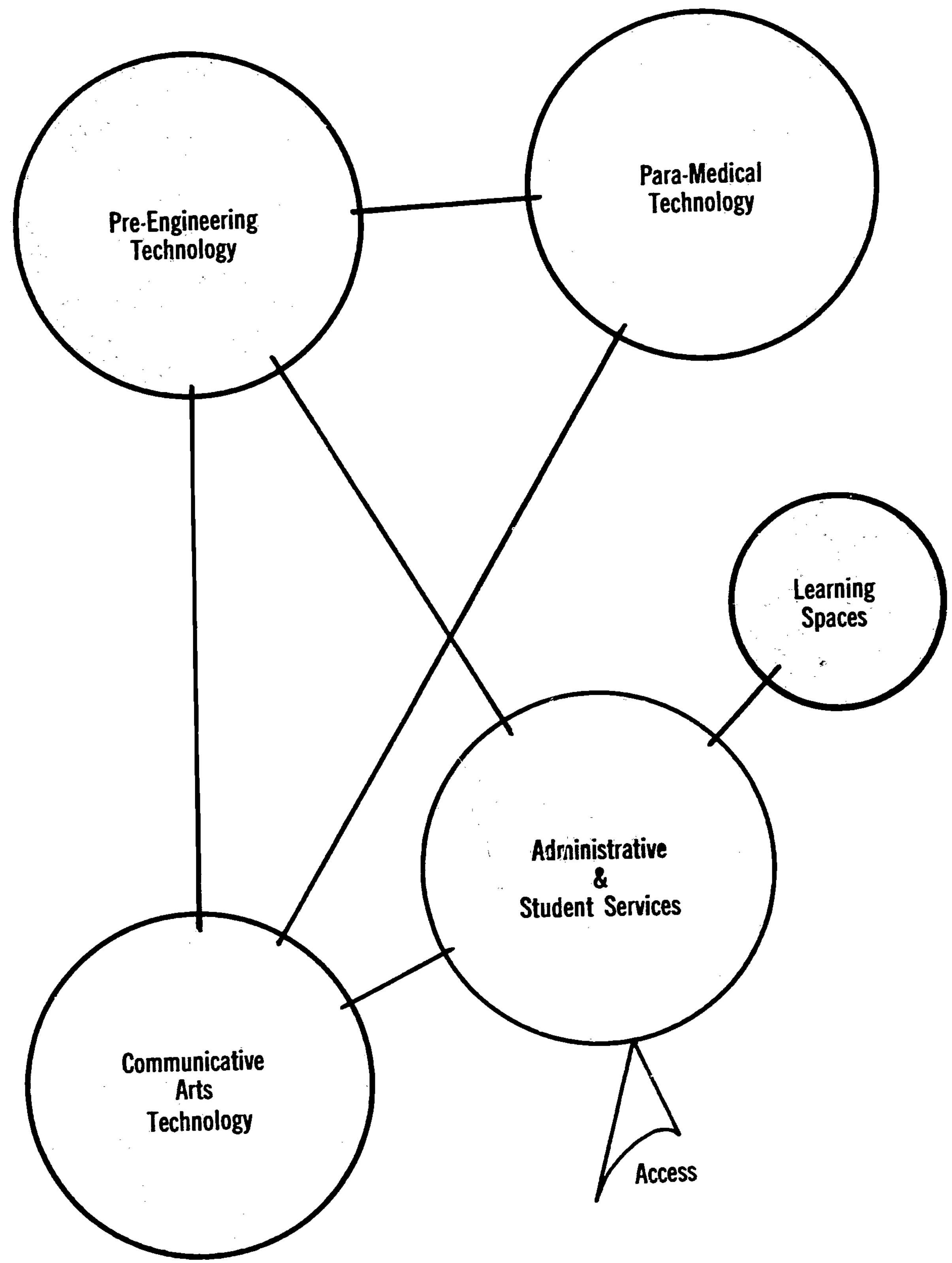
* Not included: Art, P.E., Music, Foreign Languages, Homemaking, Misc. (Driver Ed., Office Service, etc.)

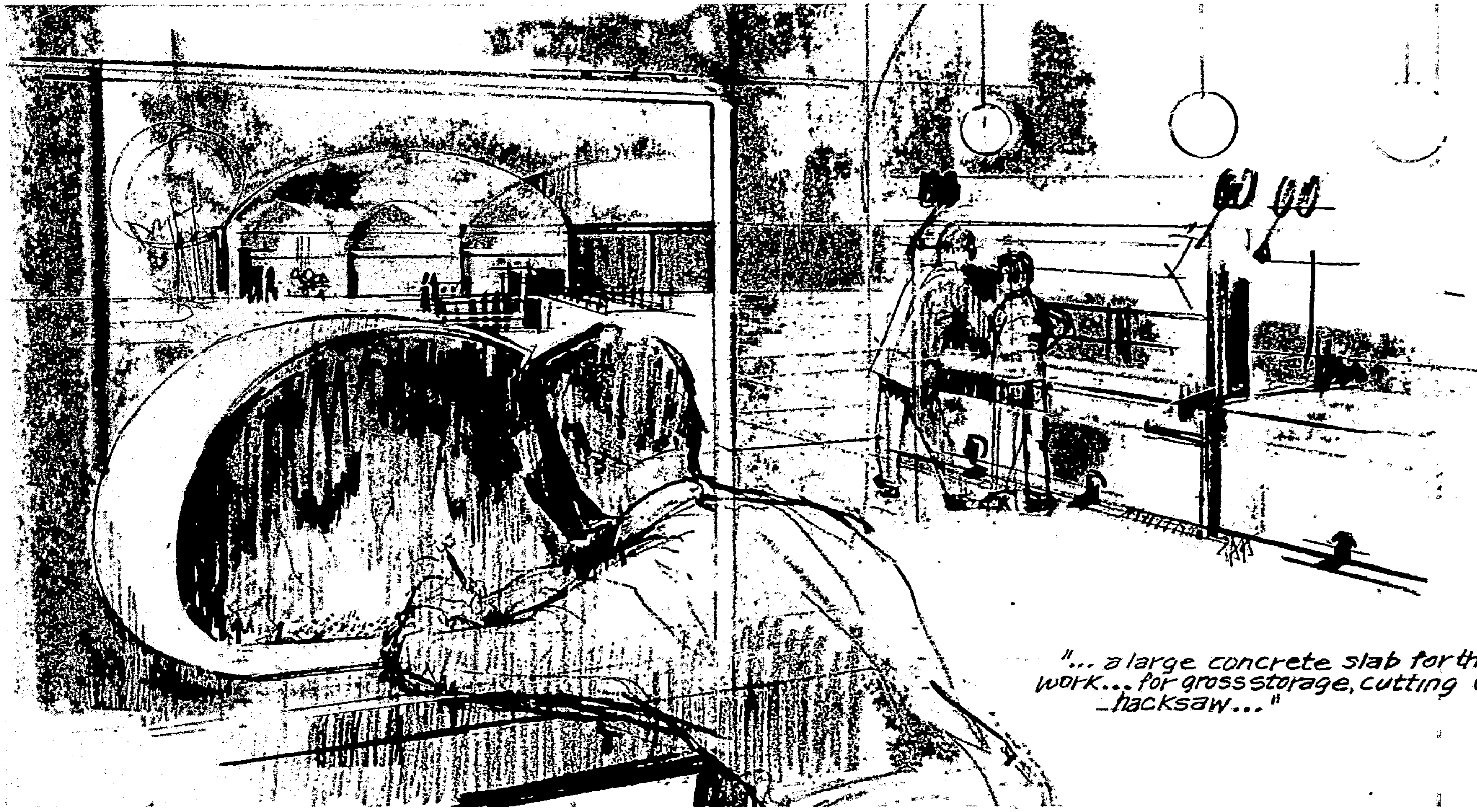
** Percentages based on Eng. Tech. program

APPROXIMATE SPACE ALLOCATIONS*

AREA		APPROXIMATE SQUARE FEET
A. PRE-ENGINEERING TECHNOLOGY CLUSTER		10,050
Processes and Fabrication Laboratory	6,000	
Systems Laboratory	1,800	
Classroom Learning Spaces	2,250	
B. PARAMEDICAL SERVICE CLUSTER		8,625
Classroom Learning Spaces	3,675	
Clinical Laboratory	3,450	
Chemical Laboratory	1,500	
C. COMMUNICATIONS TECHNOLOGY CLUSTER		7,750
Studio Spaces	2,500	
Model and Set Shop	3,000	
Classroom Learning Spaces	2,250	
D. ADMINISTRATION AND STUDENT SERVICES CLUSTER		22,940
Core Center (Administration and Services)	12,510	
Core Center (Learning Spaces)	10,430	
E. PHYSICAL EDUCATION (Not computed)		—
TOTAL NET AREA (80% of Gross)		49,365
Structural, Mechanical, Service and Circulating Area (20% of Gross)		12,341
TOTAL GROSS AREA		61,706

*Spaces recommended for locations in basements of clusters are not shown in this computation.





"... a large concrete slab for this type work... for gross storage, cutting (torch, hacksaw..."

THE PRE-ENGINEERING TECHNOLOGY CLUSTER

The pre-engineering technology cluster will utilize the following learning spaces to provide for the active and realistic participation of the students in their learning experiences.

- — systems laboratory
- — processes and fabrications lab
- — two classroom spaces
- — inorganic chemistry lab (used jointly with paramedical)
- — typing (Core-available to all disciplines)
- — graphics (Core-available to all disciplines)
- — model and set shop (used jointly with communicative arts cluster)

SYSTEMS LABORATORY

The hub of the pre-engineering cluster will be the systems laboratory. The systems laboratory will be the primary space for the erection, demonstration and testing of all physical phenomena.

This space will be immediately accessible to the fabrication laboratory and the pre-engineering classrooms—both physically and visually. It can best be described as a large, unencumbered space for thirty students in which various experiments can be erected, suspended or secured to walls, floors and ceilings.

There will be a space within the laboratory that will permit experiments that require heights up to forty feet. This space will be safely accessible to students by means of permanent steps and catwalks. This height could be partially accomplished by an aircraft type elevator that could also provide access to a basement storage space for heavy and/or bulky equipment. In addition, on-going type experiments could be set up on wheeled tables that may be stored in this space when not being worked on.

Manifolds shall provide air, water, gas and vacuum at readily accessible locations throughout the laboratory. Electrical outlets for A.C. and D.C. power shall also be readily accessible. A drainage system shall be provided in the floor.

There will be a small area set apart within or adjacent to the systems lab where six learners may write, read and plan for experiments and yet be directly supervised.

There should be six to eight individual laboratory spaces in which one or two students could conduct on-going type experiments without the necessity of setting up and tearing down equipment every day. These spaces should be capable of easy supervision on the teacher's part.

Easy access for the movement of bulky equipment will be provided so that laboratory activities can expand to outdoor spaces.

This entire systems laboratory space should be capable of being darkened in order to conduct light experiments.

PROCESSES AND FABRICATION LABORATORY

The processes laboratory is essentially a large space devoted to manufacturing processes and prototype development. It will provide a great variety of machines and equipment that will permit experiences in many technological areas. It is in this space that laboratory apparatus and experimental equipment, serving as motivational and reinforcement learning devices, will be fabricated.

A metal bench work area with 12 learner stations should be provided.

A space for planning activities should be provided for six learners. It should be enclosed for cleanliness and acoustical control but should be in visual contact with other areas of the processes laboratory. This could be incorporated with the electronics laboratory.

A heat processes area should be provided in which adequate ventilation is provided by means of hoods and exhaust systems. It should include a foundry area, a forging area, a soldering and brazing area,

and a welding area. The forging area should include a gas fired forge, heat treating furnaces (electric and gas), anvils on stands and a Hossfield Bender. The welding area should be provided with a gas manifold system and should be adequately shielded from other areas to prevent eye damage to those working nearby.

Learners in the area should be able to work outdoors when occasion arises and this area should be near the systems laboratory in order to facilitate the movement of large assemblies. A large concrete slab should be provided for this type work, part of which should be covered for gross storage, cutting (torch, hacksaw, squaring shear) and sand blasting. This area will be the receiving and storage area for bulk metal supplies. This yard area should be enclosed in such a way as to afford a high degree of security and safety.

An area should be provided for a hydraulic and an arbor press for use in assembly and disassembly.

An electronics laboratory should be provided near the sheet metal area but enclosed in such a manner as to control noise and dirt. At the same time it should be in visual contact with other areas of the processes lab. It should provide work stations for thirty students.

A corrosive-resistant environment should be provided within the processes laboratory for electro-chemical and chemical pilot plant operations. It should be an enclosed space but remain in visual contact with the processes laboratory. This space should maintain a negative atmosphere and should be well ventilated by an exhaust system in order to remove toxic vapors which might produce health hazards. In addition, a "dump" system and washable floor with adequate drainage should be provided. Provision should be made for an emergency shower and an eye-wash facility. Fire exits and safety devices, including spark control, should be installed.

Operations carried on in this area include: electroplating, electrocleaning, electro-forming, anodic processes and etching.

Services which should be available to this area include heavy electrical power (A.C. and D.C.), gas, air and water.

In addition to the space that is permanently occupied by the electro-chemical apparatus, an unencumbered space should be provided for pilot plant type experiments that scale down commercial chemical processes.

A central tool and small supply room should be provided. This area will be supervised by a technician who, in addition to maintaining inventory and dispensing tools and supplies, will maintain tools and equipment in the processes laboratory. He will require an office and a tool-conditioning facility within the central tool and supply room.

A metrology laboratory for precision measurement, layout and testing will be provided in a dust-free, de-humidified, positive air environment. In addition, it should provide a stable environment in regards to temperature and vibration control. Equipment housed in this room will include: an optical comparator, a large surface table, a metallurgical microscope, a tool maker's microscope, a sensitive weighing machine, a hardness tester, an universal tester, etc.

A glass and ceramics laboratory should be provided. Glass operations carried on in this area would include cutting, bending, drilling, welding and forming. This facility should be capable of fabricating special glass apparatus that might be specified for physics and chemistry experiments, as well as investigative type projects in which students might become involved. This facility should include heat capabilities ranging from annealing ovens to high temperature furnaces.

A plastics and synthetics laboratory should be provided within the total processes laboratory. Working surfaces should be provided for four to six students. In addition, storage facilities should be provided for supplies and equipment necessary for the support of operations carried on within the area. Provision should be made for a hydraulic laminating laboratory press, a plastic forming machine, an injection molding machine, a granulator and an electric heating oven. This area could be associated with the glass and ceramics laboratory, and equipment common to both areas, such as ovens, could be shared by both facilities.

CLASSROOM LEARNING SPACE

Adjacent to the Systems Lab will be two similar learning spaces. One will be described.

The wall separating the Systems Lab from the classroom must be movable. This wall, hopefully electrically operated, will permit isolating the learning space from noise and visual distractions (when desired).

This space will provide facilities for 30 students. The students will sit at tables which are curved in the form of a semi-circle facing an instructional area.

The instructional area will be adjacent to the Systems Lab and will provide sufficient area to allow two student demonstration tables and an instructor demonstration table. These tables will be provided with the same service facilities as the Systems Lab—i.e., power, water, air, etc.

The instructors demonstration table must be sufficient in size to allow for demonstrations. It should contain facilities for controlling the rear screen media module, the Edex student response system, the lighting environment, and a mounted closed circuit T-V camera. This camera will activate a minimum of two monitors which are suspended from the ceiling and will serve as an electronic chalkboard and magnification device.

The media module will be shared with the adjacent learning space and will contain equipment to project 8mm and 16mm sound film, strip film, and 2 x 2 transparencies.

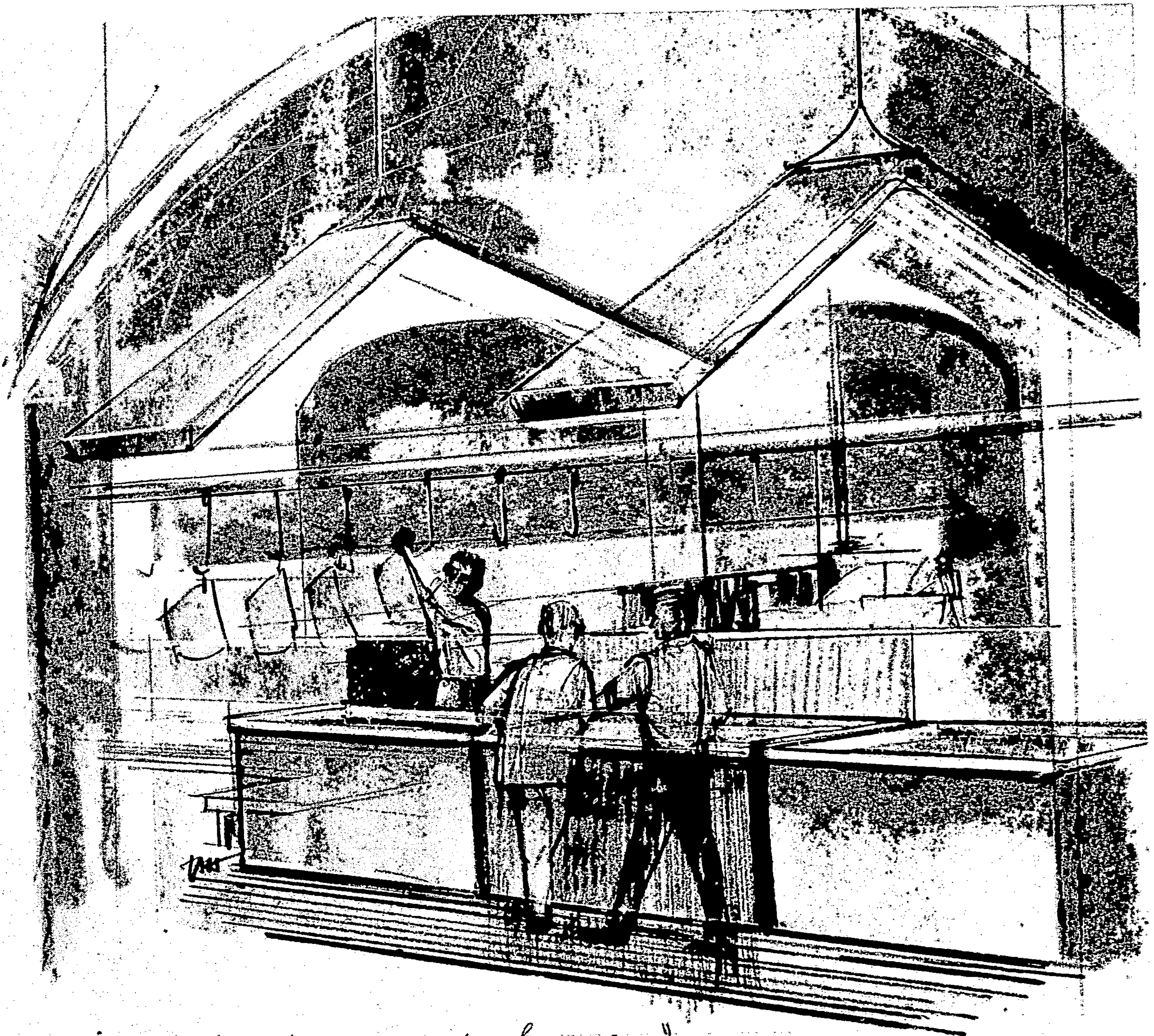
Space for storage and seminar will be incorporated into this learning space.

SUMMARY

PRE-ENGINEERING TECHNOLOGY CLUSTER

INSTRUCTIONAL SPACES 10,050

	Student Capacity	No. of Units	Total Net Area
1. Processes and Fabrication Laboratory	30	1	6,000
a. Metal Machines Processes Area	24	1	1,000
b. Sheet Metal Area	6	1	600
c. Heat Processes Area	6	1	600
d. Tools & Supply Area	—	1	1,000
e. Electro-Chemical & Pilot Plant	—	1	300
f. Metrology Laboratory	6	1	200
g. Glass and Ceramics Laboratory	6	1	150
h. Plastics and Synthetics Laboratory	6	1	200
i. Electronics Laboratory	12	1	1,350
j. Bench Metal Area	12	1	450
k. Presses Area	—	1	150
l. Student Lockers		180	—
2. Systems Laboratory	30	1	1,800
a. Unencumbered Space and Elevator	—	1	1,500
b. Individual Laboratories	1	6	300
3. Classroom Learning Spaces	30	2	2,250
a. Seminar Rooms	—	2	
b. Carrels Area	—	2	
c. Media Module	—	1	

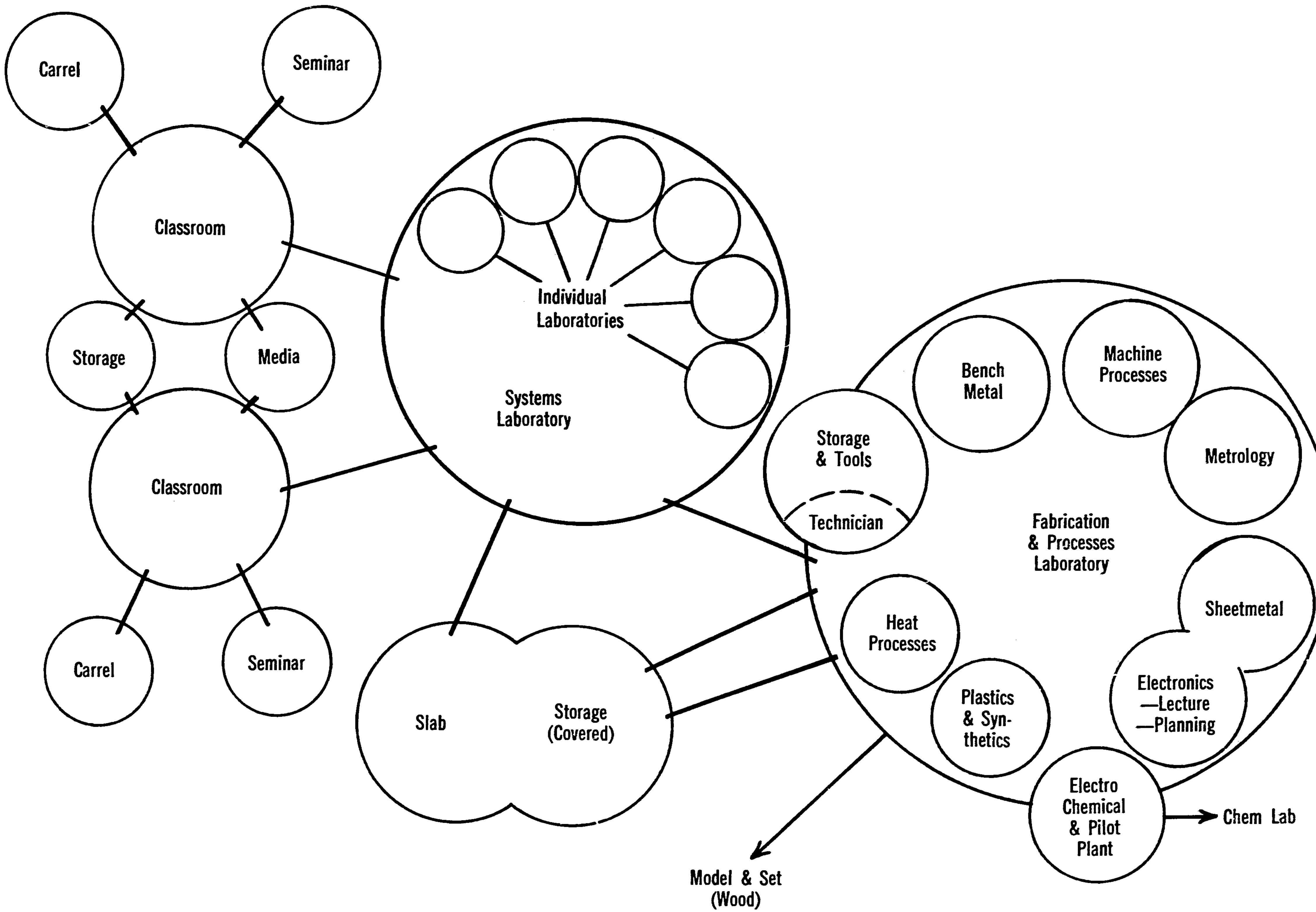


"...in this area include ; electroplating, electro-cleaning, electro-forming..."

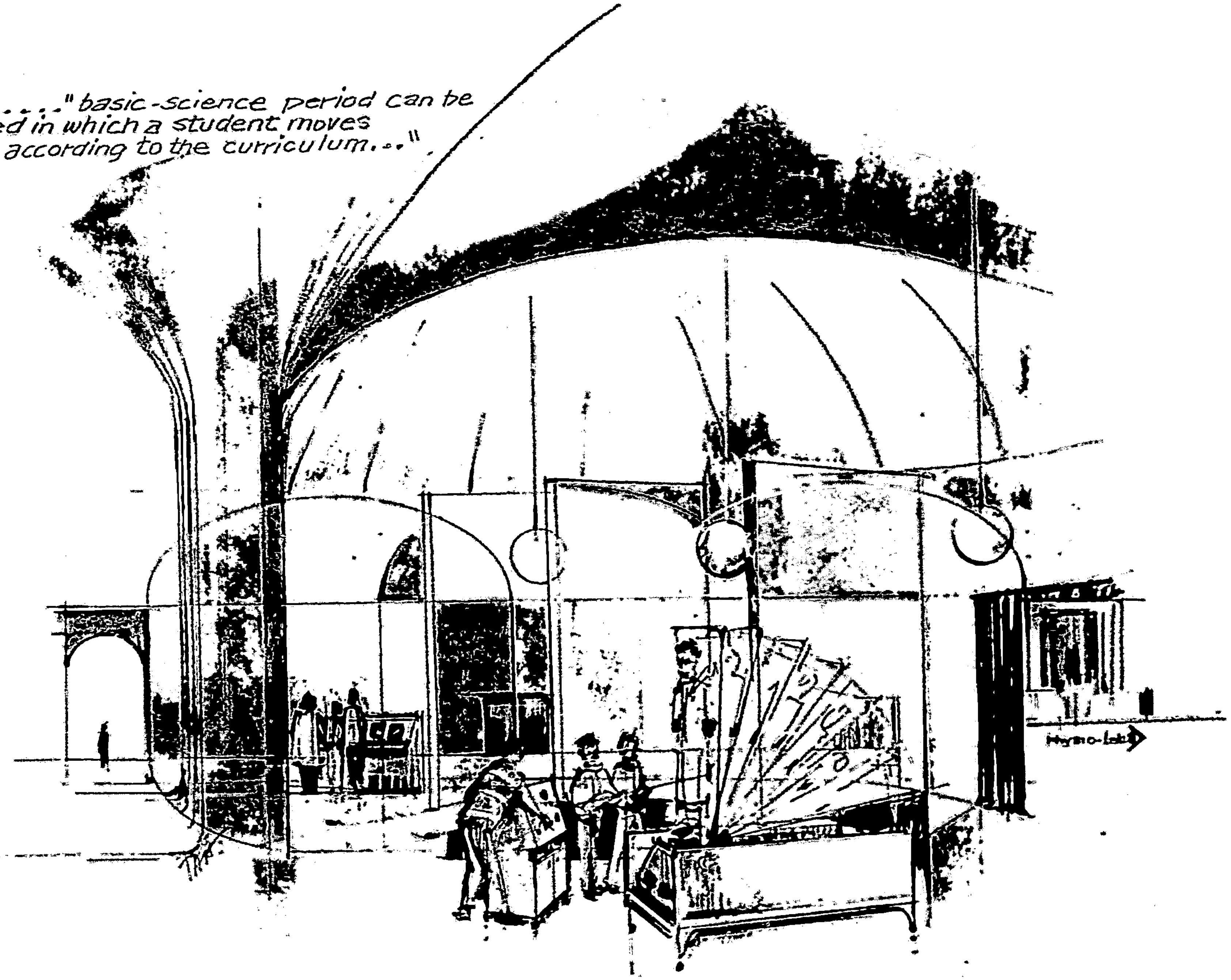
Space	Student Capacity	No. of Units	Total Area	Description of functions and special considerations.
1. Processes & Fabrication Laboratory			6,000	
a. Metal Machining Processes Area	24	1	1,000	• Appropriate safety measures. • Soft floor covering. • 220/110v service. • Fume ventilation. • Adequate lighting. • Local environment control (air conditioning). • Appropriate display area for completed projects.
b. Sheet Metal Processes Area	6	1	600	• Appropriate safety measures.
c. Heat Processes Area	6	1	600	• Forge and foundry. • Sand floor in casting area. • Storage for sand (bin). • Pattern area. • 6 electric welding stations. • 6 gas welding & cutting stations. • Hood to vent fumes. • Heliarc station. • Anvils • Heat treating furnace. • Visual shield from welding laboratory.
d. Central Tool & Supply	—	1	1,000	• Provide with appropriate bins and drawers. • Provide for classified supervision of space and issuance of tools. • Easy access to entire laboratory area. • First aid equipment for laboratory available in tool room. • Work space for repair and minor maintenance.
e. Electro-Chemical and Pilot Plant	—	1	300	• Contiguous to inorganic chem lab and tech lab for plating processes.
f. Metrology Laboratory	6	1	200	• Negative atmosphere to hold out dust. • Even temperature control. • Darkening and screen for projecting slides.

Space	Student Capacity	No. of Units	Total Area	Description of functions and special considerations.
g. Glass & Ceramics Lab	6	1	150	• Natural gas for annealing ovens. • Air conditioning.
h. Plastics & Synthetics Lab	6	1	200	• Electric oven (220v). • Air conditioning. • Fume ventilation. • Safety protection from laboratory.
i. Electronics Laboratory	30	1	1,350	• Protection from dust and dirt. • Protection for electronic measuring instruments. • RF shielding; incandescent lighting.
j. Bench Metal Area	12	1	450	• Hand metal fabrication and assembly.
k. Presses Area	—	1	150	• Hydraulic press and storage
2. Systems Laboratory	30	1	1,500	• Large unencumbered space with special equipment.
a. Individual Labs	6	1	300	• For special projects.
3. Classroom Learning Spaces	30	2	2,250	
a. Seminar Rooms	5	2	200	• Small seminar area. • Desirable to combine into one larger (10) space by use of flexible furniture. • Provide trapezoidial tables and chairs. • Carpeting
b. Carrels Area	4	4		• Study Carrels for individual study. • Carpeting. • Relate to laboratory.
c. Media Module	—	1	50	• Small nerve center with instructional media.

PRE-ENGINEERING TECHNOLOGY CLUSTER



. . . "basic-science period can be envisioned in which a student moves freely, according to the curriculum. . ."



THE PARAMEDICAL SERVICES CLUSTER

To the end of behaviorially oriented instruction, the paramedical services cluster will utilize the following learning spaces:

- — three classroom learning spaces (media-classrooms described elsewhere)
- — Physio-chem lab and preparation area
- — physio-chem storage
- — physio-examination
- — physio-exam storage
- — physio-environment area
- — inorganic chemistry laboratory
- — office practice, typing (located in core—available to all disciplines)
- — graphics (core-available to all disciplines)

PARAMEDICAL SERVICES TECHNOLOGY

The paramedical services cluster will be composed of an articulatory clinic with attendant support areas, a chemistry laboratory, and three classroom learning spaces which are contiguous to the laboratories and which "spill" into the laboratory areas by means of removable walls. The chemistry laboratory should have immediate access to the electro-chemical and pilot plant area of the previously described Systems Laboratory.

While it is not the purpose of these specifications to define a paramedical curriculum, it is important to consider a probable program while specifying facilities. A double basic-science period can be envisioned in which a student moves freely, according to the curriculum, between the learning center, physio-chem lab, physio-clinic and environmental lab.

The student may spend one week between learning center and clinic, another week between learning center and physio-chem lab, another week between all three, or any other conceivable configuration. One period of the double can be termed "basic science," the other "articulatory."

The hub of this technology is the articulatory clinic which is comparable to the systems laboratory in the pre-engineering program.

Within this clinic there will be opportunities for students to make discoveries in regards to the structure, function and control of the parts and systems of the human organism. Experiences here will strengthen the conceptual learnings of the students.

Also within this cluster will be the physio-chemistry laboratory, the physio-examination laboratory and the environmental laboratory.

The physio-chemistry laboratory will be utilized for student investigations into scientific topics relating to the human organism.

The physio-examination laboratory should resemble a medical diagnostic center and should provide opportunities to study the human organism under controlled environmental conditions.

The environmental laboratory will be a large learning space unencumbered by equipment, but with readily accessible electric outlets, water and air pipes and a vacuum system. This space will permit various pieces of equipment to be brought in and utilized in student experiments.

CLINICAL LABORATORY

The clinic should lend itself to student projects and investigations which serve to integrate the features of the paramedical curriculum. Each team space must be designed with such projects in mind.

Some activities which might be conducted by learning teams in the clinic are:

— Electro-cardiographic study of the heart with the Heathkit IMP Scope.

— Circulation studies—pulse, pressure, pigment, etc.

— Perception tests—sight, sound, touch

—Respiration studies

— Balance tests

— Muscular fatigue tests

— Eye acuity tests

—Tests of musculature coordination

— Height-weight measurements

In addition to the above-mentioned team areas, the clinic should include a soundproof examination area for tests of length and height, hearing and sight perception. Lighting should be controlled by rheostat from complete darkness to full brilliance. The examination area will house such equipment as eye charts, reaction time devices and other psychological testing devices requiring a light and soundproof room. This room should be unencumbered except for an operator's console and desk from which light intensity and other equipment could be operated.

PHYSIOLOGY-CHEMISTRY LABORATORY

This is a combined physiology-chemistry laboratory appropriate to student investigations into scientific topics relating to the human organism and its structure and function at the macro, micro and molecular levels. The emphasis in this facility is on chemical analyses procedures.

The physio-chem lab will be a life science facility providing individual student experiment stations for basic bio-chemical and physiological investigations. Each student station should include:

— sink

— water (hot and cold)

— student locker

— power (110 A.C., 0-10V, 3A, D. C.)

— gas

— temporary book storage

— apparatus rack (for instrumental experiments)

Every group of three or four individual stations should share the following apparatus:

— drying oven

— incubator (constant body temperature)

— autoclave

—reagent storage

— optical instrument storage (scopes, etc.)

— warmed air for drying glassware

Every two or three groups should share the following:

— automatic top-loading milligram balance

— large capacity triple beam balance (decigram sensitivity)

— large sink

— large capacity volumetric glassware storage

The types of experiments which could be conducted in this type of facility are exemplified by the following:

— chemical experiments such as buffering

— transport through cell membranes (osmosis)

— study of gross structure and function (anatomy)

— study of microscopic structure and function (micro anatomy)

— analysis of body fluids—sugar, urine, antibodies in blood, etc.

— bacteriology—nutrition, identification, populations, environment

— animal growth and development—ovulation and fertilization of frogs eggs

— respiration—analysis of inhaled and exhaled air

— physiological monitoring—the use of bio-transducers for continuous recording of body temperature, blood pigmentation, etc.

— prosthedics—simulation of natural functions

— heredity

— the reaction of the human organism to environmental changes

PHYSIOLOGY-CHEMICAL LABORATORY PREPARATION ROOM

A large preparation area should be included within the physio-chem lab instructional area. The preparation area should be built to accommodate large-size glassware and clean up. The area should be large enough to hold a number of students. The area should include:

- — commodious sink top (this could even be used for wet experiments)
- — electric (110V-30 amp A.C., O-10V-3 amp D.C.)
- — gas
- — air (20 PSI minimum)
- — vacuum (10" Hg)
- — two large stainless steel sinks—one deep, one shallow
- — commercial dishwasher for glassware (such as petri-dishes, beakers)
- — hot, as well as cold, water
- — common large-volume prepared reagent storage
- — student accessible storage
- — one large capacity automatic balance
- — distilled water apparatus (ion exchange)
- — experiment supply table or shelf (protect shelving and counter tops from reagents)

The experiment supply shelf is for the purpose of placing reagents, glassware and other materials for student distribution and return. It should be close to the preparation and storage areas. In fact, it might be used as a separation between lab and preparation areas so as to prevent crowding in the preparation area.

PHYSIOLOGY EXAMINATION LABORATORY

This is an area designed for the physiological examination of the human organism. The area is conceived of as accommodating small student investigatory teams (two, three or four students whose activity will be "patient" centered). Here studies of human vision, hearing, respiration, circulation, musculature, etc., will be conducted. The "atmosphere" is to be that of the medical or paramedical clinic, though with an investigatory rather than treatment or diagnostic function. While the clinic is primarily intended as an investigatory area, it should also be suitable for training students in many clinic-centered paramedical skills appropriate to the high school level.

The physiology examination laboratory is designed to accommodate the study of the human organism in a more or less "fixed environment" situation. Student teams consisting of student-examining group and student "patient", will examine the functioning of the body in a limited area which is suggestive of a real medical or paramedical clinic. Here, body functions can be monitored by a variety of electronic and mechanical equipment as the patient sits in a chair, is rotated on a turntable or exercises on treadmill or exercycle. Each team space should surround a "patient" center. Each of ten team work stations should include the following items:

- — sink and counter space
- — shelf space
- — space for typewriter
- — examination chair with broad arm rests and a head rest. Chair should not be fixed in position.
- — gas and 110V electric service
- — TV-AV media service
- — wall space for charts

PHYSIOLOGY-ENVIRONMENTAL LABORATORY

This is an area designed for the physiological examination of the human organism. This area is to be unencumbered so that furniture and equipment may be brought in on a temporary basis. The physio-environmental lab, having no furniture and "off the floor" service and built-ins should be relatively non-restrictive as to the experimental and other activities of the paramed students. Being unencum-

bered, this area will lend itself to photography, large-scale on-going experiments and other activities which require rather large areas of free space. The term "environmental" is used in its broadest sense to convey the concept that room environment is non-restrictive—that the environment can be changed at will. Thus, the term "environmental laboratory" designates an area where the paramed students can freely alter the physical environment of the organism under study.

The prime requisite is the need for a large, unencumbered floor space for large, on-going experiments and studies. Part of the floor space should be concrete with spaced drains (covered by grid or plate) for wet experiments and studies. Part of the floor space should be carpeted for first-aid and other activities requiring large floor areas. Services should be provided from overhead and include:

— concrete floor treated for "no-slip" surface

— drains on 20-foot grid

— water, 10 PSI compressed air, 110V electric service on 10-foot grid in floor and at 10-foot intervals along walls

— support brackets for spot lights and backdrops

The environmental lab should house the service elevator from the basement. Here, large, infrequently used, equipment would be hoisted to its use area and returned to storage. This service elevator would also serve the other clinic areas: physio-exam, storage, physio-chem, physio-chem storage and the clinic learning center.

STORAGE

Aside from storage areas which are accessible to students, the physio-chem lab and the physio-exam lab should have separate ground floor storage facilities which are accessible only to faculty and staff. Each of these storage areas would also supply the environmental lab. It has been suggested that the various pre-tech facilities include a commodious basement storage area with sidewalk (aircraft carrier) type elevators to the ground floor for ready access. While this seems reasonable for bulky and less frequently used apparatus and equipment, smaller more frequently used apparatus should be more readily accessible to the teacher for convenience.

Of particular importance to storage design is the matter of visibility. Storage should be in open shelves and bins in dust and pollution-free rooms. The sources of contamination during storage should be eliminated instead. Precision apparatus could be kept in beautiful condition, always visible and readily available, if the storage room has a slight positive pressure to keep out dust, if reactive reagents are stored in their own well-ventilated room, and if the air is otherwise appropriately conditioned.

INORGANIC CHEMISTRY LABORATORY

Basic chemistry instruction for the pre-tech engineering, paramed and communicative arts students should take place in a common chemistry facility. This chemistry facility should consist of:

a) student laboratory
b) learning center (media center)
c) preparation
d) individual study—computation center
e) caustic storage
f) reagents storage
g) equipment and glassware storage

These areas should be designated as follows:

1) student laboratory and preparation
2) learning center
3) individual study—computation center (to be shared with math and business)
4) caustic storage
5) reagent and equipment

Since the design of chemistry laboratories is not particularly novel, the following items should suffice to point up special features deemed important in the Richmond Plan Facility.

— There should be some direct or semi-direct connection between chem-preparation and physio-chem lab, engineering fabrication and media (communications). This could be done through the proposed basement. Chemistry prep would not require a freight-sized elevator,

however. A common basement would enable convenient and safe transport for acid and base solutions and other bulky preparations.

— A substantial proportion of one wall of the chem lab should be designed as a glass-fronted, lighted gas hood with sink, water and gas. The glass partition should protect the upper extremities of the body, but allow the student to reach under for the assembly of his apparatus. The blower on the hood should be activated by the room lights (This is an important safety provision!). The blower should be relatively noiseless with proper duct design.

— The lab should be well ventilated since many experiments produce odors which do not necessarily call for the hood and its inconveniences.

— The preparation area should be instructional and therefore part of the chem lab. To avoid crowding by students, a student supply table can be interposed between the lab proper and the preparation area.

— The preparation area should include a commercial type dishwasher for washing common glassware such as test tubes, beakers, flasks, etc.

— Services should include hot, as well as cold, water, warmed air (for drying glassware), power (110VAC), vacuum and distilled water. Cold water, power and vacuum should be provided for each student space, the remainder for larger groups.

— A balance area should be provided for joint class use. It should contain three automatic milligram top-loading balances and storage for manual triple-beam centigram and decigram student balances (which they can use at their lab space).

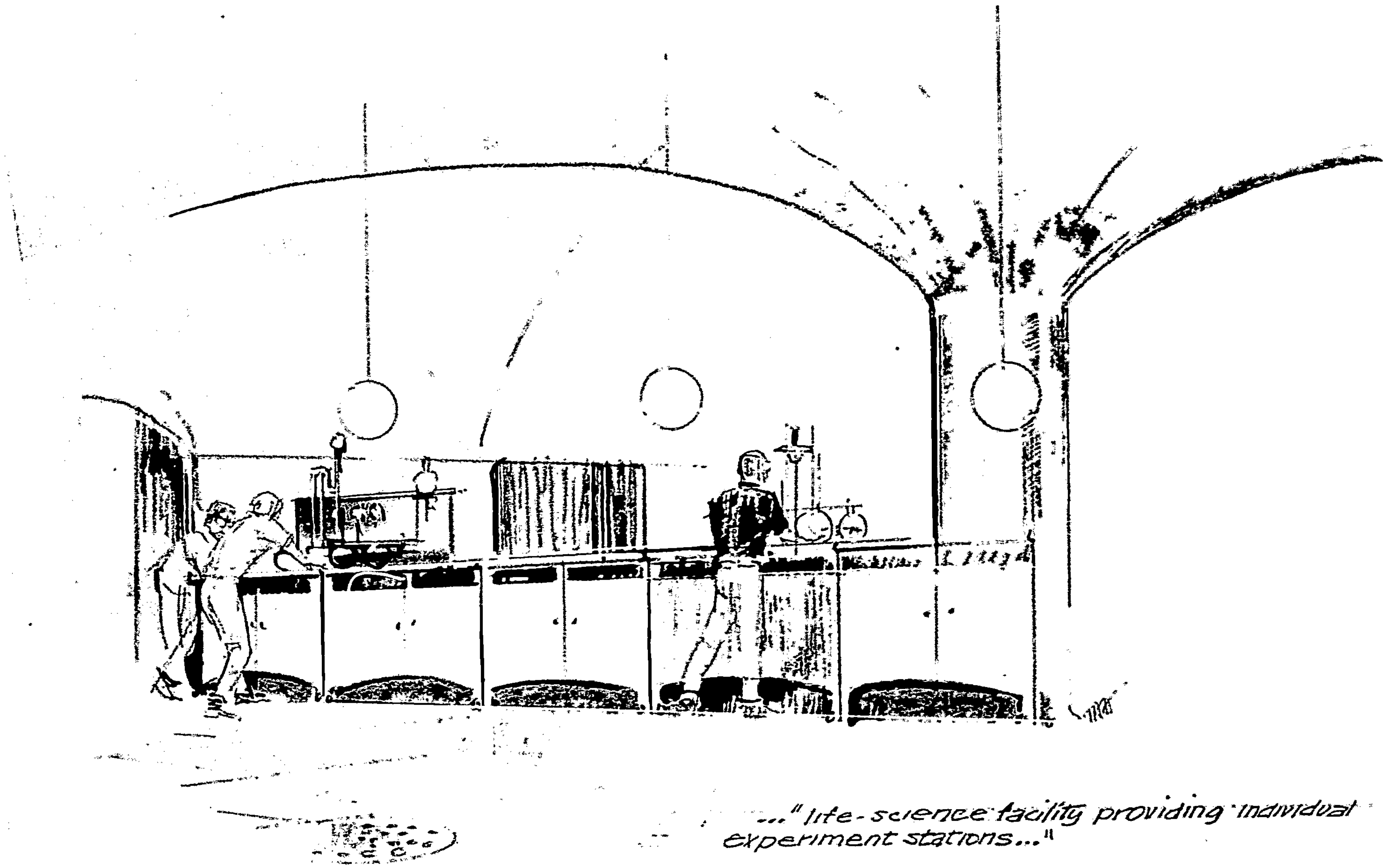
— The preparation area should include one heavy-duty automatic top-loading balance.

— The caustic storage area should be concrete lined with metal door for the storage of acids, bases, oxidizers and inflammables. Shelves should be adjustable, heavy duty and with lips to prevent stock from slipping off.

SUMMARY

PARAMEDICAL TECHNOLOGY CLUSTER 8,625

	Student Capacity	No. of Units	Total Net Area
1. Classrooms	30	3	3,675
2. Clinical Laboratory	30		3,450
a. Physio-Chemistry Laboratory			1,050
b. Physio-Examination Laboratory			1,000
c. Environmental Laboratory			1,000
d. Preparation - Technician			150
e. Clean-up			150
f. Storage			100
3. Chemical Laboratory	30	1	1,500

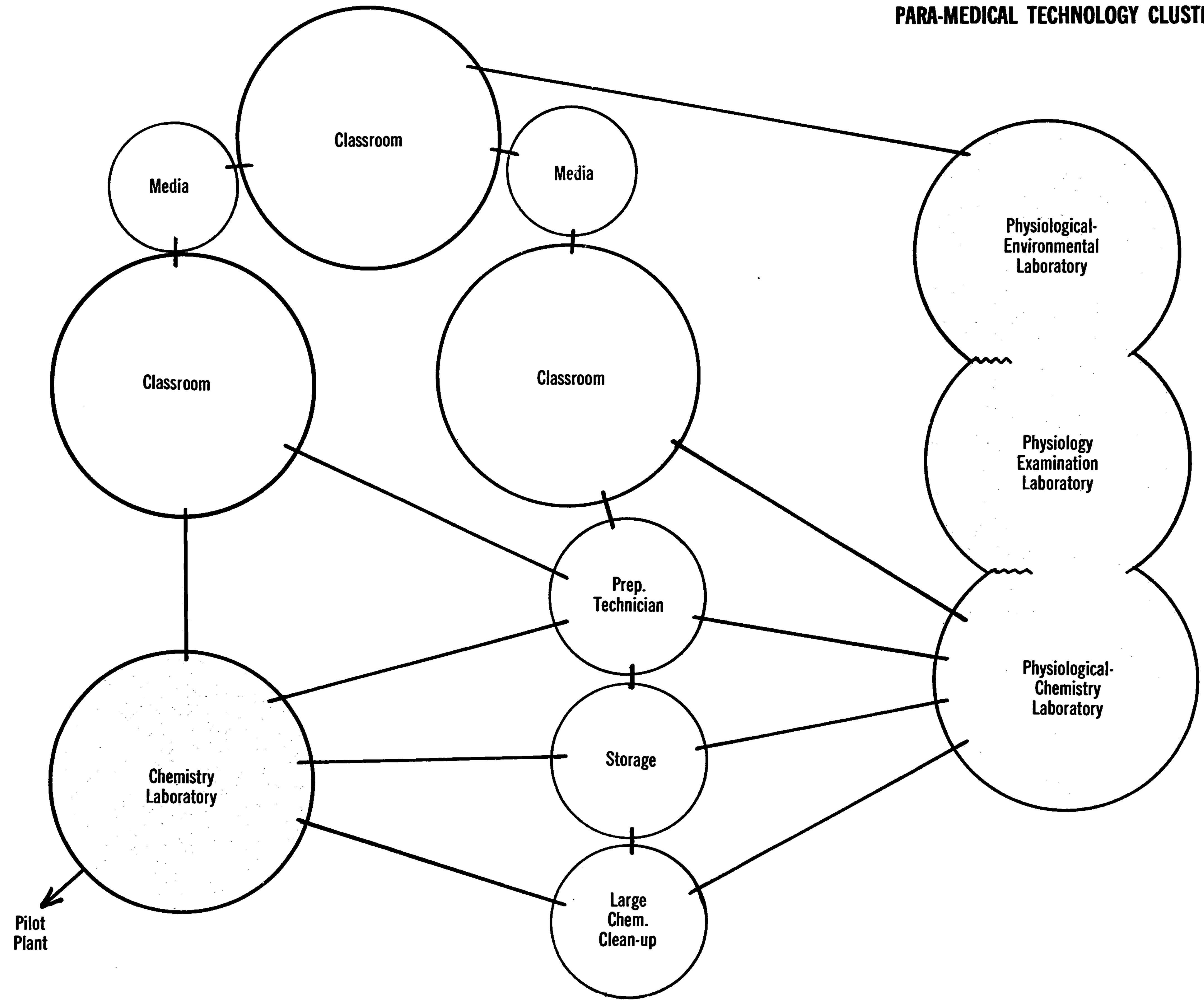


..."life-science facility providing individual experiment stations..."

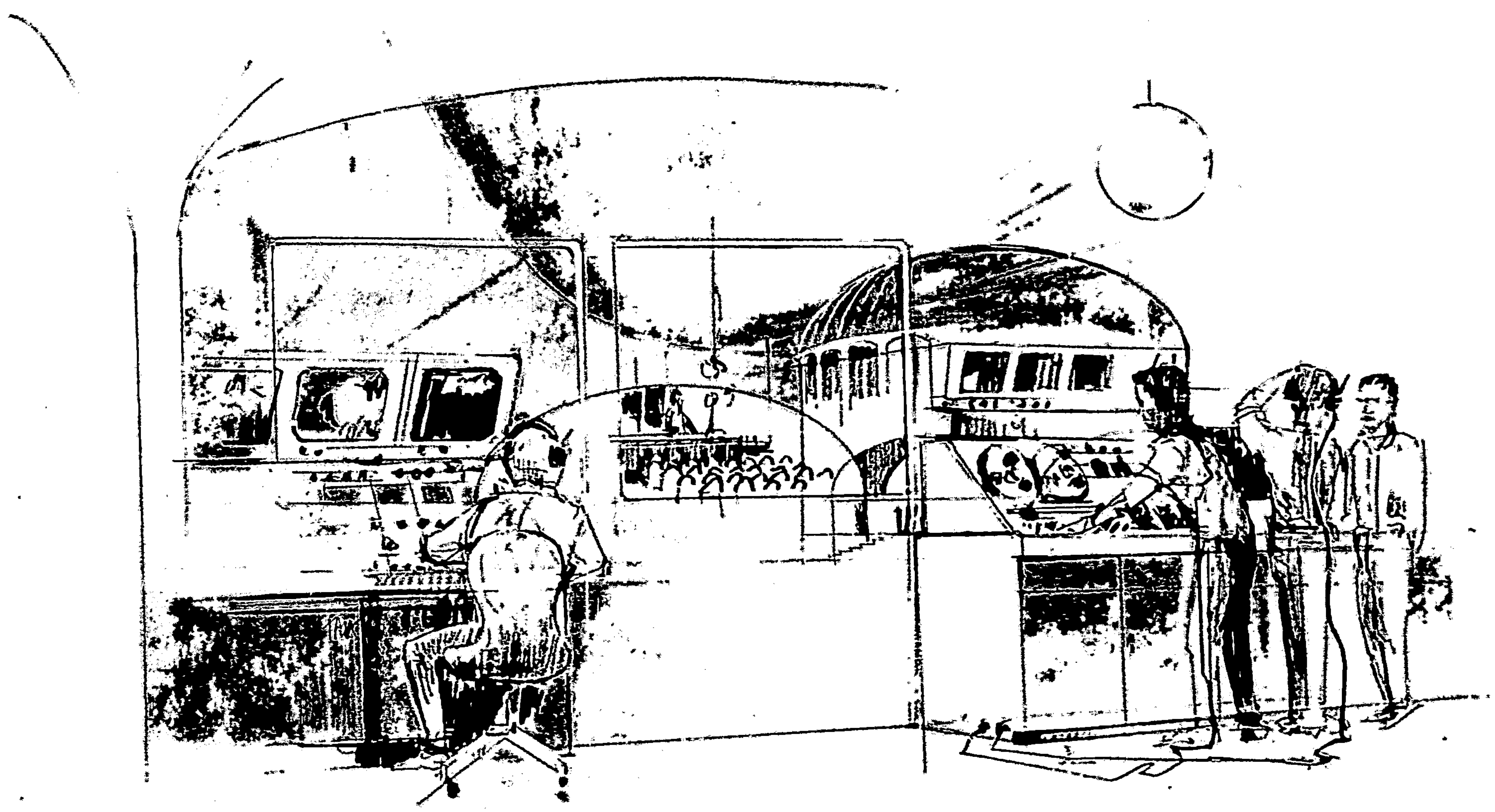
	Student Capacity	No. of Units	Area Total	Description of functions and special considerations
1. Classrooms	30	3	3,675	• Provide for media classrooms (described elsewhere).
2. Clinical Laboratory			3,450	
a. Physio-Chemistry Laboratory	10	1	1,050	• Provide space for supplies (200 sq. ft.). • Include radial lab table arrangement with 5 two-station tables with gas, water and electricity. • Relate to physio-exam area and environmental lab. • Direct access to storage and clean-up rooms.
b. Physio-Examination Laboratory	10	1	1,000	• Central examination area should resemble medical diagnostic center. • Study human organism. • Provide demonstration station with water, electricity, gas, sink, etc. • Exam area No. 1 should provide record desk and chair with typewriter stand (portable). • Exam area No. 2 should provide an examination table, upholstered and adjustable, with sterilizer on a counter, plus storage cabinet. • Provide some wall space for eye chart, etc. • Carpeting.
c. Environmental Laboratory	10	1	1,000	• Large open area with partial carpeting. • Relate to service elevator from basement. • Demonstration to simulate a dentist's and doctor's reception and business suite, and a space to simulate a dentist's or doctor's medical area. • Direct access to physio-examination area. • Provide (storageable) settee, lamp table, lounge chairs, magazine racks, counter, desk, file, medical stools.

	Student Capacity	No. of Units	Area Total	Description of functions and special considerations.
d. Preparation - Technician	1	1	150	• Area to provide control access between areas in clinical laboratory and traffic ways. • Adequate lighting and electrical outlets. • Carpeted floor surface.
e. Clean-up	—	1	150	• Sink only. • Clean-up for boys and girls. • Adequate lighting. • Wall mirror and built-in bench. • Interior door security with override. • Hard floor surface.
f. Storage	—	1	150	• Storage control to lab areas with direct access to physio-chem area.
3. Chemical Laboratory	30	1	1,500	
a. Student Laboratory and Preparation	20	1	1,000	• Include radial lab table arrangement with 5 four-station tables with gas, water, etc. • Relate to clinical lab. • Direct access to storage and equipment. • Include 200 sq. ft. preparation area. • Include balance area.
b. Learning Center	5	1	100	• Provide a media center for review and feedback.
c. Individual Study	1	5	100	• Study carrel area.
d. Caustic Storage	—	1	100	• Concrete lined with metal door. • Provide shelf spaces.
e. Reagent and Equipment Storage	—	1	200	• Provide for storage of material and equipment.

PARA-MEDICAL TECHNOLOGY CLUSTER



"have in common the single requirement for successful communications..."



THE COMMUNICATIVE ARTS TECHNOLOGY CLUSTER

The communicative arts cluster will utilize the following learning spaces to provide for the active and realistic participation of the students in their learning experiences:

- — two classroom learning spaces (described elsewhere)
- — studio
- — control room
- — model and set shop
- — outdoor slab
- — inorganic chemistry lab (joint use with paramedical and pre-engineer clusters)
- — office practice, typing (Core—available to all disciplines)
- — graphics (Core—available to all disciplines)
- — little theatre (Core—available to all disciplines)
- — film processing lab (Core—available to all disciplines)
- — editing and animation lab (Core—available to all disciplines)

COMMUNICATIVE ARTS TECHNOLOGY CLUSTER

The communicative arts technology cluster will be centered around a studio facility which will be the setting for the principal audio-visual production activities. These practical experiences will provide the framework to which the curricular offerings of the program will be related.

Supporting the studio's operation will be attendant control-projection room, equipment storage, technician office-shop, scenery and property storage, woodworking-scenery construction facility and little theater.

Two classroom learning spaces of the type described in the pre-engineering technology cluster, will open into the studio.

COMMUNICATIONS PRE-TECHNOLOGY CLUSTER
STUDIO

The hub of the communications program will be the studio facility. It is here that learners will develop projects that will reinforce interdisciplinary learnings. This facility will be a medium-size sound stage that will be the production center for motion picture filming, sound recording and video taping. An aircraft-type elevator capable of handling large scene pieces should be installed between the studio floor and the basement storage area. This could possibly be used for scene effects.

CONTROL

The studio will have a control room that will contain audio control and tape recording facilities, video control and tape recording facilities, lighting control, a magnetic film/16mm motion picture interlock projection system, an announcer's booth and video multiplexer. Included within this space will be a pre-view room for the interlock projector.

EXTERNAL SLAB

There should be a large concrete slab adjacent to the sound stage for exterior production work. A large door should permit mobility of equipment between the sound stage and the external slab. The wall of the building adjacent to the concrete slab should be treated in a manner that will make it usable as a neutral background and for sky effects. It should be landscaped around its periphery to afford privacy and a natural photographic setting.

EQUIPMENT STORAGE ROOM

A space should be provided which is accessible to the studio for storing film and video equipment such as cameras, tripods, dollies, lights, cables, etc. An area within or adjacent to this space should be provided for the technician who will maintain, repair and control the use of equipment.

CENTRAL SCENERY AND PROPERTY STORAGES

Adequate provision should be made for the storage of scenery and pròperties. Basement storage would be desirable if provision is made for easily transporting large scene pieces between the model and set shop, the sound stage, the little theater, and the storage area.

MODEL AND SET SHOP

A model and set shop should be provided for stagecraft activities. This area primarily serves as the woodworking facility for pre-engineering technician students. It should be near the processes laboratory. It should be equipped with a table saw, a cut-off saw, a band saw, a planer, a joiner and a drill press. It should contain a large unencumbered area where several large scene pieces could be worked on at the same time. A section of this shop should be set apart for painting activities. This area should contain a counterweighted paint frame that would facilitate the painting of backdrop-size scene pieces.

CLASSROOMS

Two class rooms of the type previously described should be near the studio and they should be accessible to the studio through soundproof movable walls. It should be provided with a warning system that will alert those who might attempt to enter during sound recording operations.

MODEL AND SET SHOP STORAGE

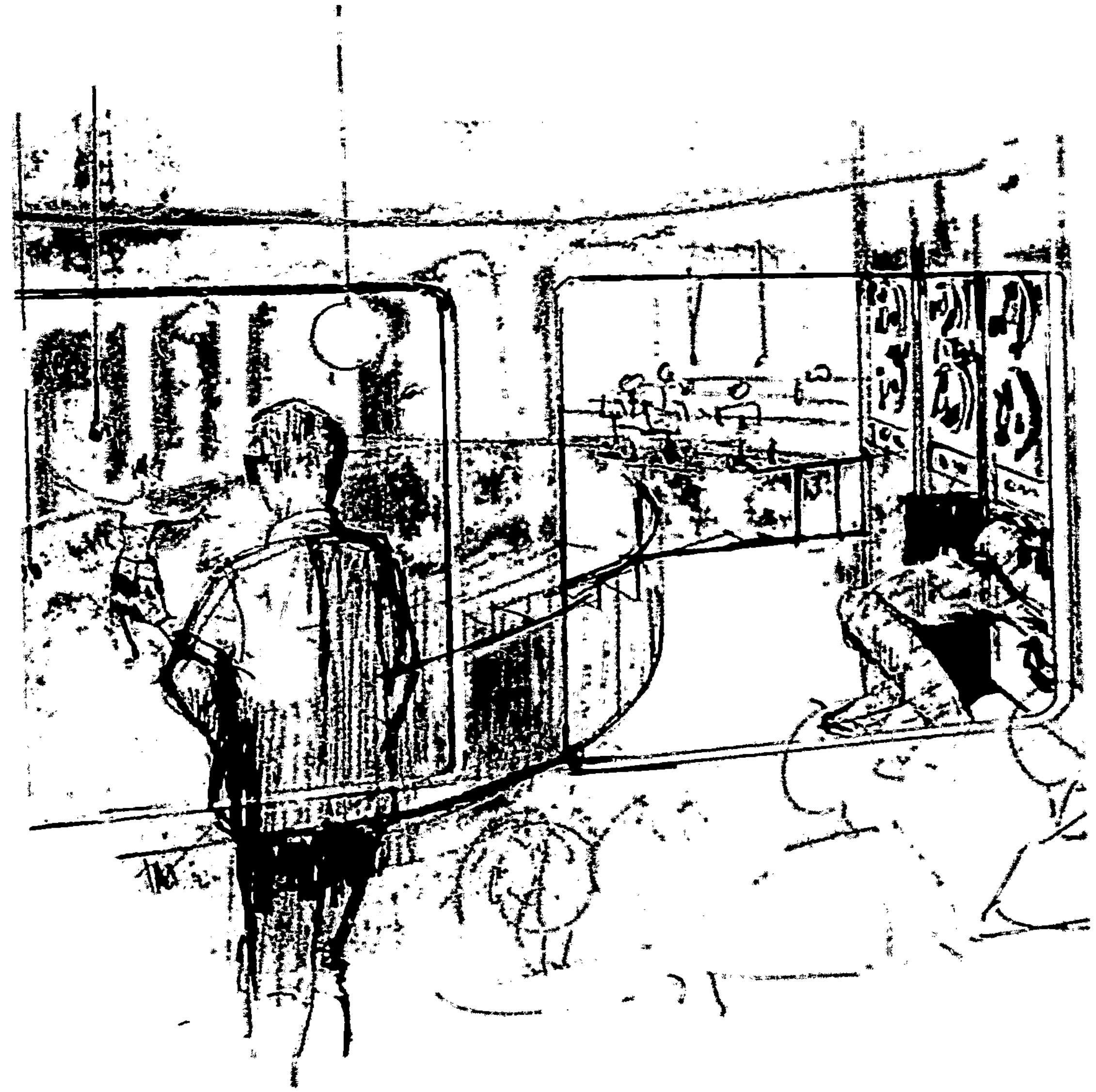
Provision for storage of lumber, hardware, paint and other supplies that are used in fabricating scenery and models should be made. This should be contained within the model and set shop or in an adjacent space—perhaps in the basement under the model and set shop.

SUMMARY

COMMUNICATIVE ARTS TECHNOLOGY CLUSTER 7,750

	Student Capacity	No. of Units	Total Net Area
1. Studio	20	1	2,500
a. Control Room	3	1	
b. Outdoor Slab (2,000 square feet)		1	
c. Equipment Storage)	Basement		
d. Technician Work Center)			
2. Model and Set Shop	20	1	3,000
Scenery and Props Storage	Basement		
3. Classroom Learning Spaces	30	2	2,250
Media Module		1	

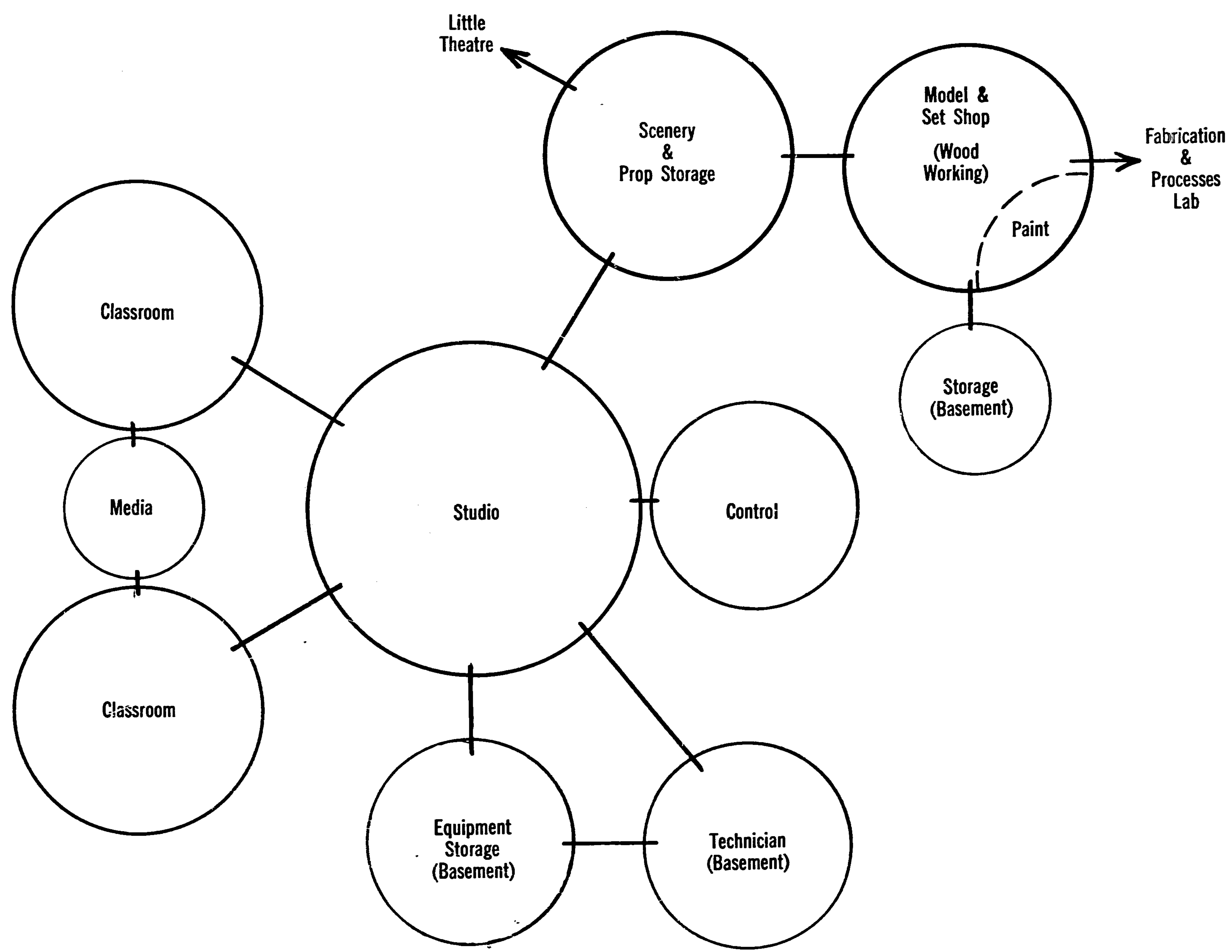
learning spaces will open into the studio.

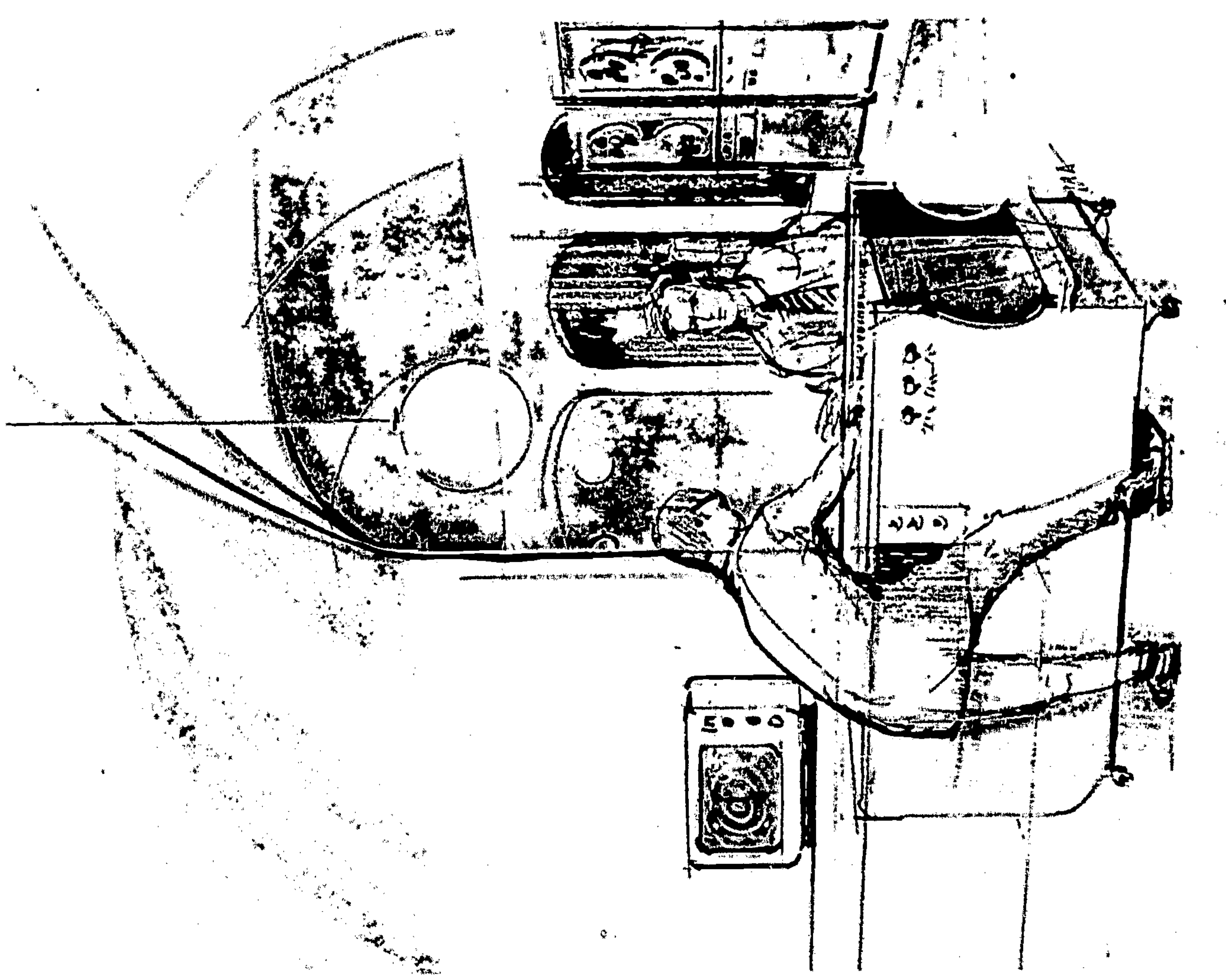


COMMUNICATION TECHNOLOGY CENTER

Space	Student Capacity	No. of Units	Total Area	Description of functions and special considerations.
1. Studio Area			7,750	
a. Studio Lab	30	1	2,000	• Studio and staging areas coordinated through the Control Room. Flexible as to size within larger space given. Some production, i.e. science demonstration may require little space. • High ceiling. • Racks for lights, light controls, camera connections, etc. • Wall plugs for electrical wiring.
b. Control Room	6	1	500	• Studio control for cameras, intercom, audio-video recordings and lighting. Control area may control more than one production simultaneously.
c. External Slab		1		• Concrete slab adjoining studio with electrical and coaxial connections for televising materials too large for studio. (Not included in building square footage.) • 2,000 square feet.
d. Equipment Storage		1	Basement	• Storing of film and video equipment such as cameras, tripods, dollies, lights, etc. • 200 sq. ft. for maintenance, repair and control of equipment.
e. Scenery and Property Storage		1	Basement	• Storage of flats, production of properties and scenery.
2. Model and Set Shop		1	3,000	• Machinery for forming wood and metal, painting area, spray booth. • Acoustically isolated from other areas. • 14-foot ceiling.
3. Classroom Learning Spaces		2	2,250	

COMMUNICATIVE ARTS TECHNOLOGY CLUSTER





CENTRAL CORE

The Central Core is the hub of the three technology areas. The Core has a dual role—it contains the administrative/services spaces and also learning spaces shared by the three technology programs. All spaces in the Core should be readily accessible to one another and to the special spaces of the three programs. Not only will the Core serve the facility educationally, but it is anticipated it will become the heart of community services.

Administrative and Student Service Spaces:

- faculty and administrative offices
- library
- student lounge
- little theater

Central Core Learning Spaces:

- computer and data processing
- two classroom learning spaces (described in the Pre-Engineering section)
- office procedures and typing
- journalism and duplication
- graphic arts
- film processes
- media learning laboratory
- physical education facility (basement)

ADMINISTRATION AND STUDENT SERVICES CLUSTER — CORE

THE SERVICES AREA

The administrative suite should provide offices for a director, vice-director and program coordinators. Further, office spaces for teachers will be centrally located.

A faculty meeting-dining-lounge room with table-seating for 24 and work table stations for at least six is needed.

There will be a student meeting-lounge area large enough to accommodate one-third of the student body at tables and have space for food-dispensing machines.

The business office should provide desk space for four classified personnel, a fire storage area, and sufficient area for files, duplicators and machine calculators.

A 60-pupil-station library that will contain general reference materials and recreational reading books should be built in a 'quiet area.' Special technical books will be stored in the facility in which they are to be used.

An audio-visual center will be incorporated into the library where a large number of films, slides and recordings may be stored for immediate use by any teacher.

CENTRAL CORE LEARNING SPACES

GRAPHIC ARTS LABORATORY

A graphic arts laboratory should be provided that could serve as a combination drafting, art and journalism facility. This area should contain *thirty drafting tables* that could be used for both art and drafting. An area within this large space should be set apart for journalistic activities. This area should contain a phototypositor, a hot press, a Polaroid-type copying camera, a Thermofax machine, a Xerox machine, six typewriters (Varityper and others), collator and assembly tables for organizing material for the duplication center. The phototypositor and hot press could also be used for the preparation of movie titles.

DUPLICATION CENTER

A duplication center should be provided near the journalism area of the graphic arts laboratory and the office procedures classroom. It should contain a camera, a platemaker, and a small offset press. Also included in this area should be a duplicating machine, and a sign printer. Since "messy type" operations are carried on in this center, a lavatory with hot water should be provided for workers.

OFFICE PROCEDURES

The business machine area should include the following spaces:

— Eight record-keeping stations for machines; i.e., 10 adding machines, printing calculator, rotary calculator, bookkeeping machine, etc.

— Eight stations for office production of forms, etc., equipped with typewriters and transcribing machines.

— Eight stations for individual typing and study; headphones should be provided to give access to tape-audio-center.

— Eight stations for filing, library procedures, data processing instruction; tables are suggested.

DATA PROCESSING

— Two stations for typewriter-teaching machines, I.B.M. card punch, I.B.M. collator and other I.B.M. machines or equipment necessary for data processing instruction.

Provide for noise control. Quiet activities, i.e., filing and transcribing, should be isolated. The design should permit supervision in all spaces by a single instructor.

TYPING

A classroom for typing instruction should be provided in the core area. This room will be used by all students in the facility. Space for 30 students will be necessary here.

COMPUTER

It is assumed that a computer will be incorporated into the facility. This may involve one of the type by which "on-line" instruction can be given to students.

CLASSROOM LEARNING SPACE

Two classroom learning spaces of the type described will be located in the core area. This additional classroom (for social studies) is necessary to provide classroom space for the curriculum that will be offered in the facility.

MEDIA LEARNING — COMPUTER LEARNING LAB

A language lab with space for 30 students will be in the core area. Instruction in oral English will take place in this lab and it will be used by all instructors. It will provide a complete electronic learning laboratory.

TEACHER RESEARCH and DEVELOPMENT and DUPLICATING

A space in the core for teachers to do research and development.

FILM PROCESSING LABORATORY

A film processing laboratory should be provided for developing black and white 16mm and 8mm motion picture film. In addition, a darkroom for still photographic equipment for up to six learners using the facility at a single time should be provided. This area should be accessible to learners in communication, paramedical and pre-engineering programs.

EDITING ROOM

An editing room should be provided so that six students at a time will be able to edit, cut, splice and synchronize sound motion picture film. This area should include a vault in which completed film materials could be stored.

ANIMATION ROOM

An animation room should be provided for filming titles, art-work and animation studies. This room should be near the graphic arts room.

LITTLE THEATER

A little theater that will seat approximately 350 students should be accessible to the model and set shop and the scene and property storage areas. This little theater will serve as a general assembly area for the student body, a rehearsal hall, an auxiliary studio, a large group learning space, a theater for presenting school plays, a community auditorium, and a dressing room and costume storage area for the TV and film productions. Adequate fly loft space should be available.

DRESSING ROOMS

Dressing rooms should be provided in the space under the stage of the little theater. One dressing area should be large enough and provide sufficient make-up stations so as to enable a unit in cosmetology to be conducted for paramedical students. Make-up classes for film, TV and stage could also be conducted here and film and TV productions could make use of this area when needed.

A costume center should be located in this area that will permit the construction of costumes and their storage. This area should include a sewing and fitting room and lavatories.

The total space under the stage should be capable of being closed off when not in use.

SUMMARY

CENTRAL CORE (ADMINISTRATION AND SERVICES) 12,510

	Personnel Capacity	No. of Units	Total Net Area
1. General Office Area			2,160
a. Reception and Lobby	—	1	600
b. Faculty Offices	1	12	960
c. Faculty Work Lounge	15	1	400
d. Workroom/Storage	—	1	200
2. Administrative Office Area			1,150
a. Director's Office		1	250
b. Vice-Director's Office		1	150
c. Secretary's Office		1	150
d. Coordinator's Offices		3	450
e. Conference Room		1	150
3. Service Areas			9,200
a. Student Lounge	180	1	1,800
b. Food Dispensary		1	600
c. Library and Media Center	60	1	1,500
d. Little Theater	360	1	5,000
e. Research and Development		1	200
f. Computer Room		1	100

SUMMARY

CENTRAL CORE (LEARNING SPACES) 10,430

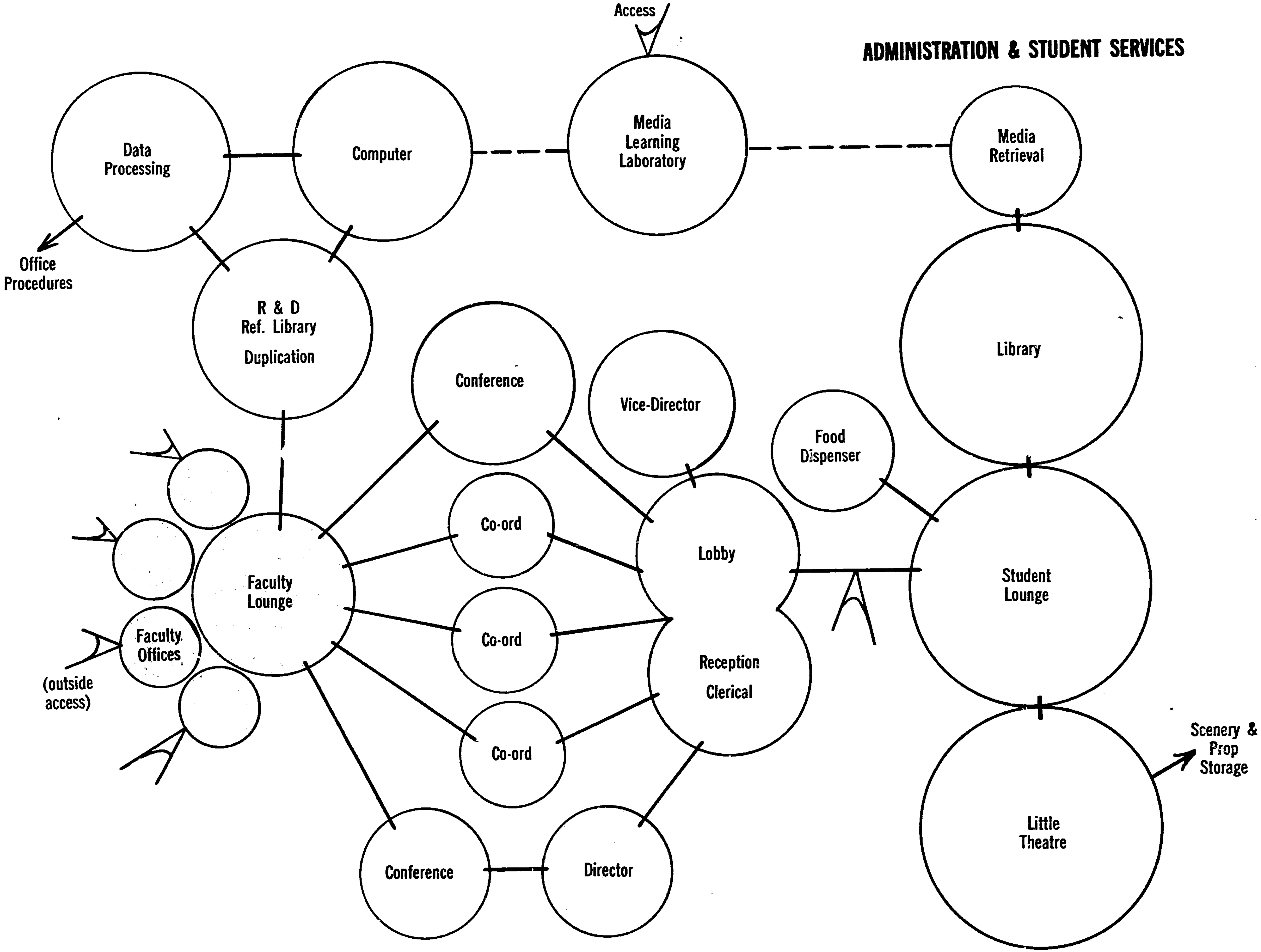
	Personnel Capacity	No. of Units	Total Net Area
1. Learning Spaces			10,430
a. Classrooms (Media Module-1)	30	2	2,250
b. Typing	30	1	1,200
c. Office Procedures	30	1	1,500
d. Graphic Arts	30	1	2,000
e. Data Processing	6	1	250
f. Journalism	6	1	375
g. Duplication	6	1	375
h. Animation —	—	1	100
i. Editing	6	1	200
j. Film Processing	6	1	200
k. Dark Room	6	1	200
l. Film Vault	—	1	80
m. Media Learning Laboratory	30	1	1,700

CORE: ADMINISTRATION/SERVICES

Space	Personnel Capacity	No. of Units	Total Area	Description of functions and special considerations.
1. General Office Area			2,160	• Relates to public entrance and provides a welcoming atmosphere.
a. Reception and Lobby	—	1	600	• Provide space for secretaries and entrance to faculty and administrative offices. Storage files, desks, clock and office equipment will be located in this area.
b. Faculty Offices	1	12	960	• These will be utilized for work, conferences and individual guidance. • Will provide space for teachers to "hole up" and think alone. • Will be accessible to offices and provide for student access without office disturbance.
c. Faculty Work Lounge	15	1	400	• Provide for dining/work/meetings. • Accessible to all central areas. • Comfortable furniture and work stations provided.
d. Workroom/Storage	—	1	200	• Work and supply storage space provided for secretaries. • Accessible to reception/lobby area. (See interdisciplinary concept.)
2. Administrative Office Area			1,150	
a. Director's Office	1	1	250	• Primarily his workroom and conference room. • Directs activities of the whole facility operation. • Uses office for teacher conferences, form planning, etc. • Direct access to reception/lobby.
b. Vice-Director's Office	1	1	150	• Easily accessible to administrative section. • Used for conferences with students and parents. • Provide maximum privacy.
c. Secretary's Office	1	1	150	• Direct access to Director's Office. • Will provide for administrative work and storage.
d. Coordinator's Offices	1	3	450	• Provide work space and conference area for parents, teachers, students.

	Capacity Student	No. of Units	Total Area	Description of functions and special considerations.
e. Conference Room	8	1	150	• Provide teacher/administrator/parent conference space.
3. Service Areas			9,200	
a. Student Lounge	180	1	1,800	• Provide space for minimum of 180 students eating or lounging.
b. Food Dispensary	—	1	600	• Adjacent to student lounge. • Space for food dispensing machines.
c. Library and Media Center	60	1	1,500	• Seating for 60 students and storage for 5,000 volumes. • Media storage and retrieval.
d. Little Theater	360	1	5,000	• Seating for 360. Used for communicative arts, large lectures, assemblies and plays. • Will provide for community services. • Made accessible for evening use without access to other Core areas.
e. Research and Development and Duplicating	—	1	200	• Space for faculty study. • Book, media accessibility (see interdisciplinary concept). • Duplicating equipment. • Sink.
f. Computer Room	—	1	100	• On and off line computer. • Wiring to special areas to be determined.

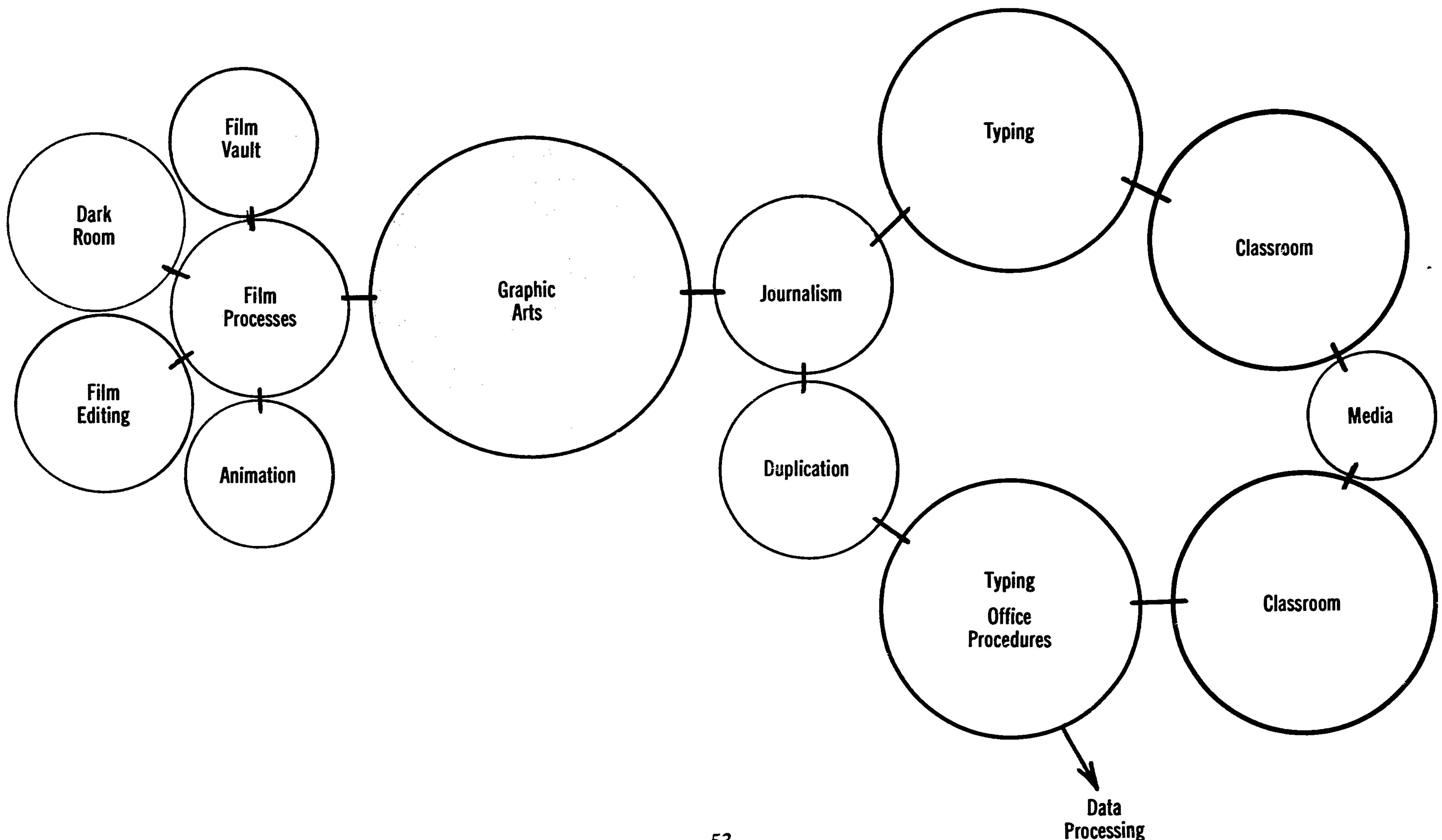
ADMINISTRATION & STUDENT SERVICES



CORE: LEARNING SPACES

Space	Personnel Capacity	No. of Units	Total Area	Description of functions and special considerations.
1. Learning Spaces			10,430	
a. Classrooms (Media Module-1)	30	2	2,250	• General classroom spaces.
b. Typing	30	1	1,200	• Provide for learning and study hall work stations. • Audio-video media to be provided.
c. Office Procedures	30	1	1,500	• Typing stations, office machines. • Learning and working space will be utilized by entire facility.
d. Graphic Arts	30	1	2,000	• Provide learning and facility working space. • Services entire facility in graphics.
e. Data Processing	6	1	250	• Accessible to computer and office procedures spaces.
f. Journalism	6	1	375	• Accessible to graphic arts and duplication space.
g. Duplication	6	1	375	• Semi-learning and service space. • Will service entire facility.
h. Animation	—	1	100	• Light controlled for film animation.
i. Editing	6	1	200	• Accessible to other communicative arts clusters.
j. Film Processing	6	1	200	• In same complex with other video spaces.
k. Dark Room	6	1	200	• Special light control with minimum of lost work space.
l. Film Vault	—	1	80	• Secure for film storage. • Temperature and humidity control.
m. Media Learning Laboratory	30	1	1,700	

LEARNING SPACES



PHYSICAL EDUCATION

Current district planning envisages the facility being built on district-owned property adjacent to Contra Costa College. It is possible that students will use the community college outdoor facilities, but with its constant growth, it would be virtually impossible to plan on using the indoor facilities.

Locker and shower spaces for a student body of 360 would have to be included. In addition, a portion of the basement should be developed into a modified field house for rainy days and for special activities such as wrestling, tumbling, gymnastics, weight-lifting, drill and exercises.

This space could also be used as a recreational room.

With an operational physical education program, the faculty would go up two more teachers (Physical Education).

This modification is necessary as a result of planning a separate school site rather than building at an existing high school.

GENERAL CONSIDERATIONS

SITE CONSIDERATIONS

It is important to point out specific problems peculiar to the site and the implications they have upon the educational program. In developing the site for the pre-technology facility, consideration should be given to the development and utilization of land adjacent to the building. Vehicular traffic, prevailing winds and noise from exterior sources are problems that may need special treatment.

VEHICLE ACCESS AND PARKING

Parking spaces should be provided on a 100 percent basis for instructional, clerical and custodial staff. The total staff will approximate 25 people.

It is predicted that from 5 to 10 persons will visit the pre-technology facility during any given school day, exclusive of specific educational activities. These visitor spaces should be located in a small lot apart from any other parking spaces and adjacent to or near the pre-technology facility. The student parking for the secondary school campus could provide for the needed student parking. It would be expected that evening adult school students would use the staff and visitor parking lot. The campus master plan should reflect any expansion of parking spaces.

All parking areas can be designed on the assumption that 25 percent of utilization will be for small compact cars. In addition, separate parking areas should be provided to accommodate two-wheeled vehicles.

Unloading for school buses and private vehicles should be provided away from the parking lots. When buses are used for special events or field trips to hospitals or industries, stations should be provided for loading and unloading.

AUDIO-VISUAL CONSIDERATIONS

Central to the considerations of the over-all pre-technology facility is the role and function of the audio-visual material and services *to the instructional program*. Technology in the recent years has provided an ever widening variety of methods of information presentation and dissemination with reasonable ease. Primary to our thinking is the ability to accommodate the methods that are presently in existence and those that may come into existence in the future. Centralizing these functions, where practical, will enable us to render the highest quality service to the faculty without undue manpower requirements. However, consideration should be made in the design of individual classrooms to accommodate conventional media, in addition to the new, for maximum flexibility for the instructor. This flexibility should allow the instructor to use any or all of the full range of audio-visual media, or none, as the program dicates. To accomplish this, the entire facility will be linked to the central Audio-Visual Control Room for video and audio reception and dissemination, and two-way communication between classroom and A-V Control.

Some specific considerations should be kept in mind:

1. The main arteries of communication between Studio Control and the other parts of the building should be large conduit and initially should contain at least two coaxial cables, multiple audio pairs, as well as two-way communications lines. It should be sufficiently large and accessible to allow additions at a later date.

2. The secondary arteries within the total facility should be located in such a way that it will allow a multiplicity of inputs and outlets, allow additional lines to be laid with ease, and accommodate interconnections between classrooms as necessary.

3. The electronics systems utilized should be engineered for compatibility throughout the facility for quality of operation and maintenance. Permanent sound systems capable of stereo sound should be provided to all instructional spaces. In areas such as the little theater where speech reproduction is anticipated, a separate voice reproduction system should be provided (requirements for speech reproduction being substantially different from music).

4. Classrooms should be wired for remote control of conventional audio-visual equipment at the teacher station (for either front or rear projection, either directly to equipment or through a portable control console).

5. Full range lighting control should be provided in all lecture areas, the applications laboratories, and classrooms utilizing a substantial amount of visual materials (i.e., art, history, biological sciences).

6. Sound reproduction in each lecture area may be incorporated into the television receivers or special speakers depending on the recommendations of consulting engineers.

7. Provisions for the dial system or similar system which allows rapid retrieval and ease of expansion should be made.

8. Accessible storage for portable A-V equipment should be provided in the building. Provisions for rolling vehicles, such as carts, etc., must be provided into each center of the building.